

SDI Advanced Frame Synchroniser.



STANDARD FEATURES

- 2 x 1 SDI input switch
- Auto 625/525 line locking
- 10-bit processing
- H & V timing adjustment
- Ancillary data pass or blank
- Audio tracking pulse output
- Minimum delay mode
- Looping reference input
- Video test pattern generator

OPTIONAL FEATURES

- Video processing amplifier
- Delay tracking & re-sampling of embedded audio
- Audio I/O sub-modules

SO, IT'S A SYNCHRONISER

The standard V1641 SDI Frame synchroniser performs the same basic functions as the V1640 except that it includes a 2 x 1 SDI input switch. This is useful, for instance, when switching between the SDI output of an ADC converter and a direct SDI signal source. It provides synchronisation of the selected SDI signal to an external analogue video reference. Both horizontal and vertical offset from the reference can be user adjusted and the output can be set to go to black or to freeze if the input fails. A 'Minimum Delay' mode is provided. In this mode the reference input is ignored and the delay through the unit is less than a few microseconds. The unit will automatically switch to 'Minimum Delay' mode if the input system standard (625 line 50Hz or 525 line 60Hz) is different to that of the reference.

AND IT CAN ALSO BE A PROC AMP

A Video Processing Amplifier (option /VP) can be programmed into the unit during manufacturing test. This provides control of video gain, chroma gain, luminance black level and hue shift.

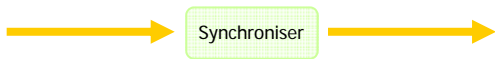
AND IT CAN ALSO PROCESS EMBEDDED AUDIO

An internal Audio Processor (option /AP) can be programmed into the unit during manufacturing test. The processor re-samples and delays a single embedded audio group from the SDI input. The audio delay tracks the video delay through the synchroniser. The input audio group number can be selected and re-assigned at the output. The facility to blank all other input groups is provided. Alternatively, if one of the following audio I/O sub-modules is fitted, the unit can be set to blank all input or output groups.

AND IT CAN EMBED OR EXTRACT EXTERNAL AUDIO

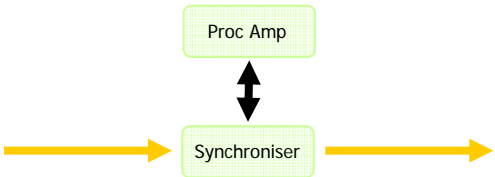
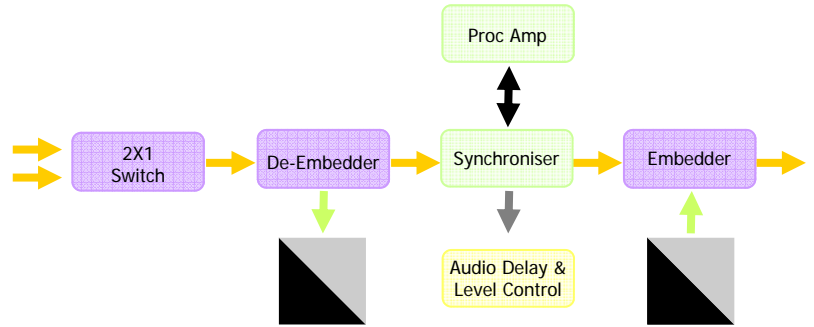
One of four audio I/O sub-modules (options /AA, /AD, /DA or /DD) may be fitted to embed and/or extract a single audio group. Both analogue and digital AES types are available.

Note: If an audio sub-module is required/fitted, then option /AP must be included.



So How Do I Use It?

Let's start with the core building block – the synchroniser. With SDI inputs and outputs, it can be used to lock any SDI signal to a station reference. And because the output timing can be adjusted with respect to the reference, the unit can be used to correctly time a signal to any other device in the system, for example a vision mixer.



And there's a Proc Amp as well?

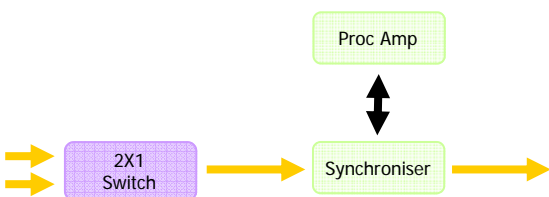
Yes, the synchroniser on its own only sorts out the timing of the signal. If there are any signal level problems, then a Proc Amp is essential. This gives you control of Video Gain, Chroma Gain and Black Level (Set Up).

Test Patterns	
Black	75% Bars
100% Bars (625 only)	SMPTE Bars (525 only)
Timing markers	Max Ramps
SDI pathological	

So can the synchroniser handle embedded audio?

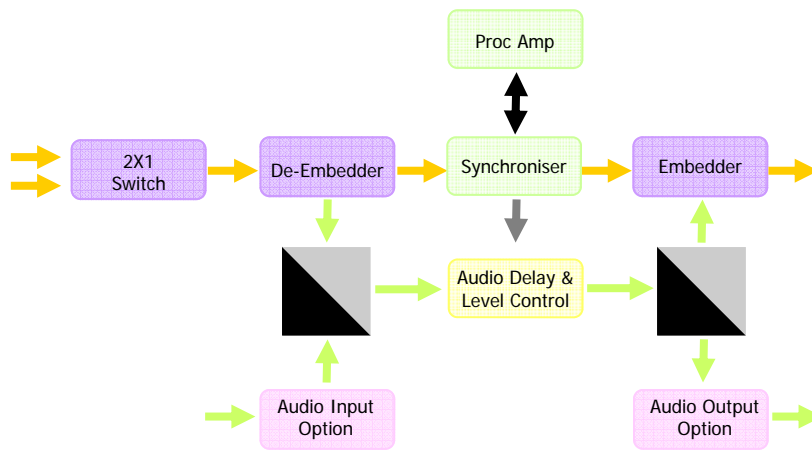
Like most SDI synchronisers, the V1641 can either blank or pass ancillary data in the SDI signal – so it can blank or pass embedded audio. However, if the reference/input timing relationship is varying, then there is a risk that, at some stage, the synchroniser will repeat or drop a frame in order to maintain the correct output timing. When it does so, a conventional synchroniser will produce a disruption in the embedded audio data – Producing a 'click' or 'pop'.

The V1641, equipped with the /AP (Audio Processing) option, gets around this problem by de-embedding audio before the signal goes to the video synchroniser. As well as tracking the video delay and compensating for frame repeat or drop, the audio can also be delayed by an additional fixed amount (up to 1.25s). The audio can also be processed, to alter levels, to change phase, and to swap channels. Finally, the audio is re-embedded on the SDI output – no 'clicks' or 'pops' – and lipsync is maintained in all cases.



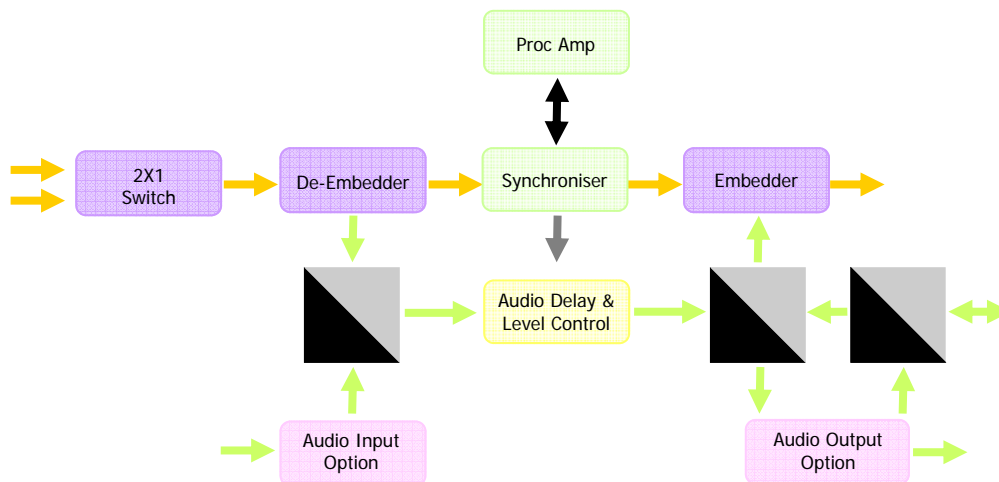
What about this 2 x 1 switch?

It's often useful to be able to select the input to a synchroniser. For example, there may be a main feed and a standby feed, and being able to switch between them saves on issues like external routers. A common scenario for this is when a router is used as a standby for a vision mixer. The same source signals are available as inputs to both the mixer and the router, so that if the mixer fails, source selection can still take place on the router. However, there is still a need to select either the mixer or the router as the programme chain device. The built-in switch of the V1641 neatly solves the problem.



How can I hook up to external audio?

By adding a piggy-back module to a V1641 equipped with the /AP option, the audio processing block may be switched to accept 2 external stereo audio channels. These can either be analogue or AES digital depending on the piggy-back option chosen. Each type also adds external audio outputs at the end of the audio processing block. A choice of five piggy-backs provides all possible combinations of analogue or digital inputs and outputs. Because the audio I/O is handled by piggy-back modules the V1641 can easily be updated if signal types are changed.



Supposing I need more complex audio processing?

When digital output versions of the piggy-back are chosen, an additional facility becomes available, that of re-entrant audio. Each of the two digital AES outputs has a 'copy' output. These can be switched to become re-entrant inputs. Either or both can then be selected as sources for embedding on the SDI output, provided the AES stream(s) at these inputs are clock synchronous to the AES outputs of the V1641. This facility is particularly useful when coupled to an external audio processor such as Vistek's V1639. In such a case up to 4 mono channels may be re-mixed and re-entered into the embedded audio stream within the V1641.

Option Module	Inputs (standard type)	Outputs (standard type)	Re-entrant output possible?
/AA	2 stereo	2 stereo	No
/AD	2 stereo	2 AES	Yes
/DA	2 AES	2 stereo	No
/DD	2 AES	2 AES	Yes
/HH	1 AES, 1 stereo	1 AES, 1 stereo	Yes (1 ch AES only)

Technical Specification

Serial Inputs (2)

Standard	ITU-R B1601
Format	EBU Tech 3267-E and SMPTE 259M-C
Sampling	4:2:2, 10 bit
Line/field rate	525/60 and 625/50
Connector	BNC
Impedance	75
Return loss	>15dB, 5-270MHz
Cable equalisation	0-250m (Belden 8281)
Data rate	270Mb/s

Serial Outputs (2)

Format	As input
Connector	BNC
Impedance	75
Return loss	>15dB, 5-270MHz
Cable drive	Up to 250m (Belden 8281)

Analogue Reference

Signal	Colour black, 1V p-p composite
Connector	BNC
Impedance	75 or Hi Z for looped output
Return loss	>35dB to 5.5MHz

Delay Pulse/Reference Loop Output (selectable)

Connector	BNC
Delay pulse:	
Level	TTL
Range	0 to 1 frame, repeat is 2 frames
Reference Loop:	
Signal	As reference input

Option: Video processing amplifier (Suffix /VP)

Option: Embedded audio processing (Suffix /AP)

Audio embedding format

Standard & level of operation	SMPTE 272M, level A, B and C
	External AES input can be asynchronous to SDI clock

Note: Auxiliary AES inputs (C & D) must be synchronous

Sub-Module Options:

Audio input/output (Suffix /AA or /AD or /DA or /DD or /HH)

Analogue audio inputs (2 stereo) - Options AA and AD

Analogue audio inputs (1 stereo) - Option HH

Resolution	24-bit
S/THD+N	<-85dB
Dynamic range	105dB
Max input	12dBu to +24dBu in 1dB steps ->0dBFS
Input impedance	20k
Input format	Balanced

Digital Audio Inputs (2) - Options DA and DD

Digital Audio Inputs (1) - Option HH

Audio format	AES-3
Channels	2 AES/EBU data streams
Impedance options	75 unbalanced BNC or 110 balanced screw terminal

Analogue audio outputs (2 stereo) - Options AA and DA

Analogue audio outputs (1 stereo) - Option HH

Resolution	24 bit
S/THD+N	<-85dB
Dynamic range	105dB
Max output	0dBFS -> 12dBu to +24dBu in 1dB steps
Output impedance	<50
Output format	Balanced

Digital audio outputs (2) - Options AD and DD

Digital audio outputs (1) - Option HH

Audio format	AES-3
Channels	2 AES/EBU data streams
Impedance options	75 ohm unbalanced BNC Or 110 ohm balanced screw terminal

Ordering Information

	Order code + Suffix
SDI frame synchroniser	V1641
With Video Processing Amplifier	/VP
With Embedded Audio Processing	/AP
With Audio Sub-Module	/AA or /AD or /DA or /DD or /HH

Note: Audio sub-modules can only be fitted to V1641 units equipped with the /AP option

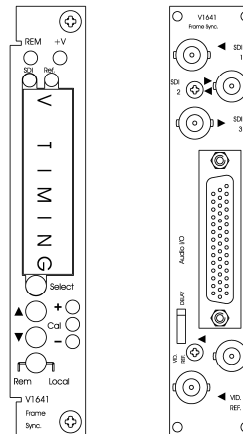
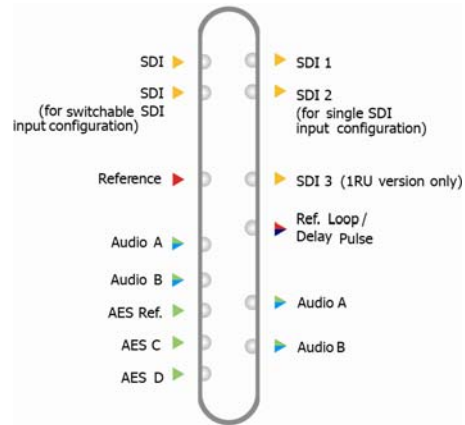
Example:

SDI Frame Synchroniser with Embedded Audio Processing and Analogue Inputs with Digital Outputs	V1641/AP/AD
SDI Frame Synchroniser with Video Proc Amp, Embedded Audio Processing and Digital Inputs & Outputs	V1641/VP/AP/DD

Controls

Video input select	1 or 2
Video gain	± 6dB
Chroma gain	± 6dB
Black level	± 127 ten bit levels
Hue shift	± 45° in steps of 0.7°
Horizontal timing	To +63.9µs (625/50)
Vertical timing	± 128 lines
Vertical blanking	Pass/blank (line selectable)
Freeze	Run/field 1/field 2/frame
Minimum delay mode	On/off
EDH generator	On/off
Audio input Demux	Group select
Audio output Mux	Group select
Mux source	Internal/external
Audio channel gain	-16dB to +15dB
Audio channel phase	Normal/invert
Audio delay	0 - 1250ms
Tracking audio delay	On/off

Controls dependent on options and configuration.



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