SyncBrightUp™

USERS MANUAL

Revision 1.1

Device triggered by an audio beep that superimposes a white mark on a video signal and generates a sync pulse for the purposes of synchronisation

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Definitions

Warranty

Articulate Instruments Ltd warrants the SyncBrightUp against defects in materials and workmanship for a period of one year from receipt by the user. During that warranty period, Articulate Instruments will either, at its option, repair or replace products, which prove to be defective. Articulate Instruments can accept no responsibility if the SyncBrightUp is used other than in accordance with the instructions supplied. This warranty applies to the initial purchaser only and is not transferable. Full Terms and Conditions are contained in the Warranty Terms and Conditions enclosed with the system.

General EMC (Electromagnetic Compatibility) Guidelines

Electromagnetic Interference
Electromagnetic interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. The SyncBrightUp unit is designed to comply with applicable regulations regarding EMI.

Declaration of Conformity

CE Marking

Manufacturer:

Articulate Instruments Ltd.
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Product Designation: SyncBrightUp (Model SBU)
Product description: Generates synchronization signals on audio and video channels in response to an audio pulse.

The above mentioned product(s) meet the essential requirements of:

Application of Council Directive: **2004/108/EC** on the approximation of the laws related to Member States relating to electromagnetic compatibility, as amended by: Council Directive 93/68/EEC.

Product Specific Standards:
EN55022: 2006 Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement.
EN55024: 1998 + A1: 2001, A2: 2003 Information technology equipment. Immunity characteristics. Limits and methods of measurement.

Reference Standards to which Conformity is declared:
EN55022 : 2006 Radiated Emissions Class A
EN61000-4-2 : 1995 + A1, A2 ESD immunity (+- 8kV air, +-4kV contact)
EN61000-4-3 : 1996 Radiated immunity (3V/m, 80Mhz-1000MHz, 80% 1kHz AM)
(EN61000-4-3 : 2006)

Testing Laboratory:
York EMC Services (2007) Ltd
www.yorkemc.co.uk
UKAS No 1574

I, the undersigned, hereby declare that the equipment specified by this declaration conforms to the listed directives and standards

Signature:  Date: 07 January 2011

Name: Alan Wrench
Position: Managing Director

Safety Precautions

WARNING: To Prevent Fire or Shock Hazard, Do not expose this system to rain or moisture.

Getting Started

Inspection

Upon receipt of your SyncBrightUp unit it should be examined immediately for any evidence of damage. Damaged shipments should be reported promptly to the carrier, who is normally liable for such damage.
All documentation, airway bills and packing materials should be retained in order to establish claims. After notifying the carrier of shipping damage, please also advise Articulate Instruments Ltd so that we may assist in damage claims and supply replacement equipment if necessary.

System Features

- **Works in conjunction with an NTSC or PAL video source, a speaker/headphone source and a microphone or line-level source.**

SyncSyncBrightUp unit Description

The SyncBrightUp unit includes the following ***supplied*** components**:**

- SyncBrightUp Unit
- 2x 1.5m stereo 3.5mm jack to jack cable
- 2x 1m BNC to BNC video cable

The SyncBrightUp unit is designed to provide synchronisation signals on video and audio channels simultaneously in response to an audio pulse or tone. Typically the unit is connected between a composite video source (e.g. camera or ultrasound) and a composite video recorder (e.g. PC with Adlink Angelo RTV frame grabber) and also connected between an audio source (mic or line-level) and an audio recorder (e.g. PC with soundcard). The unit derives the trigger from the rising edge of a short tone or click from a headphone level output from a PC soundcard or other audio output device. When used in conjunction with the Articulate Assistant Advanced software, video and audio data recorded on separate channels can be temporally aligned. A set of four 2kHz

tones are generated by the unit at the same instant that a white square is superimpose on four de-interlaced frames of the video signal. A subsequent series of pulses on the audio sync signal correspond to the vertical sync pulses on the composite video signal. This allows the video frame rate to be measured with respect to the audio sample rate and accurately aligned regardless of any discrepancy between the nominal and actual sample rates of either the signal or the recording devices.

To operate the system the following ***additional*** items are required:

- A sound source (e.g. Speaker output from PC soundcard).
- An audio input signal (e.g. microphone)
- An audio recorder (e.g. microphone input on PC soundcard)
- A video recorder (e.g. framegrabber video card in a PC)
- Software to align the video flash and audio sync signal (e.g. Articulate Assistant Advanced)

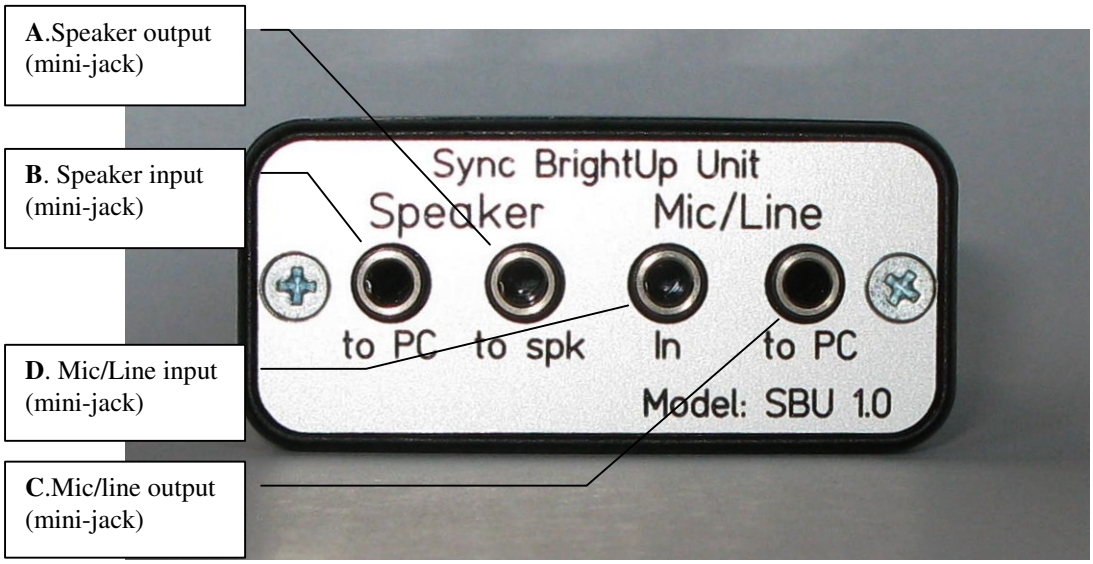


Figure 1 SyncSyncBrightUp unit

Setup

The SynSyncBrightUp Unit is simple to use:

1. Connect the microphone or line source to the “Mic/Line In” 3.5mm jack socket. Set the switch to mic or line appropriately.
2. Connect the “Mic/Line to PC”
3. Connect the Video output from the ultrasound machine (or other video source) and the video input on the SyncBrightUp unit with the BNC cable provided.

Figure 2 Sync and video inputs

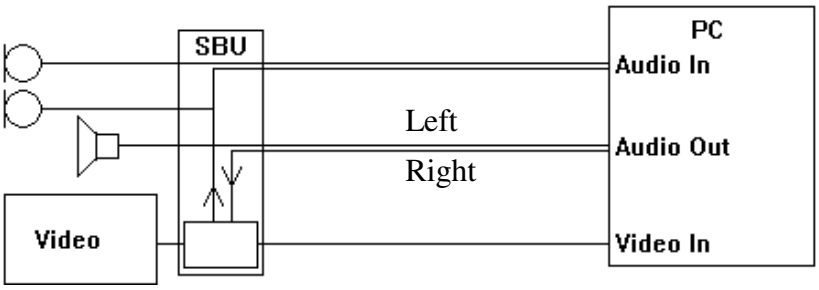
4. Connect the video output on the SyncBrightUp unit with the video input on your video capture card.
5. Connect the speaker output from the PC to the “spk to PC” input.

The SyncBrightUp unit is now ready to be used.

6. The unit will automatically superimpose a white flash in the top left of the video in response to the initial edge of a tone or click on the audio input (spk in). At the same instant a set of four 2kHz tones are superimposed on the audio output (mic/line to PC) The start of each of these 4 tones is aligned with the vertical sync from the video signal. Following the four tones there are several pulses aligned with the vertical sync of the video.
7. Optionally, the “spk out” can be connected to a speaker so that the output from the PC speaker can be heard.

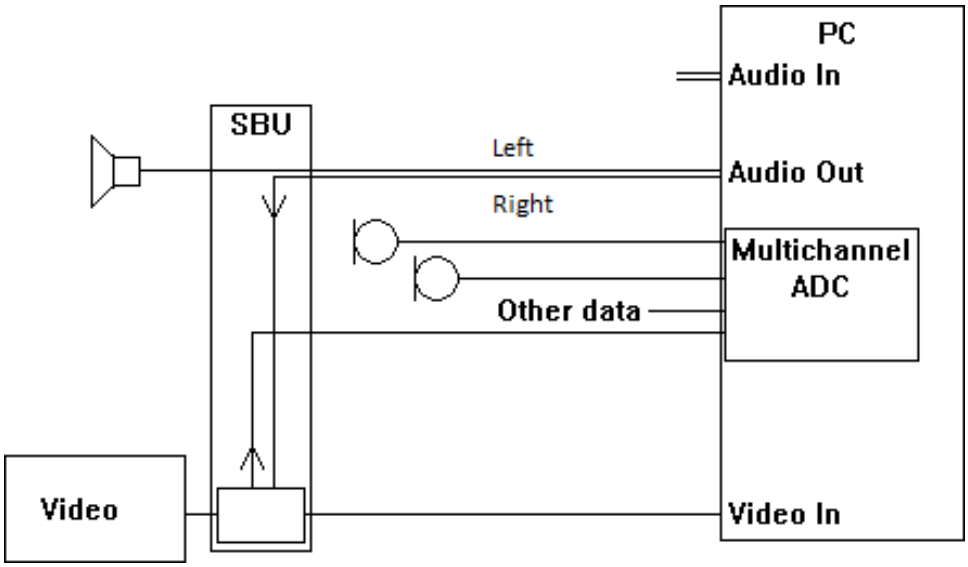
Video Sync-Bright-Up with soundcard

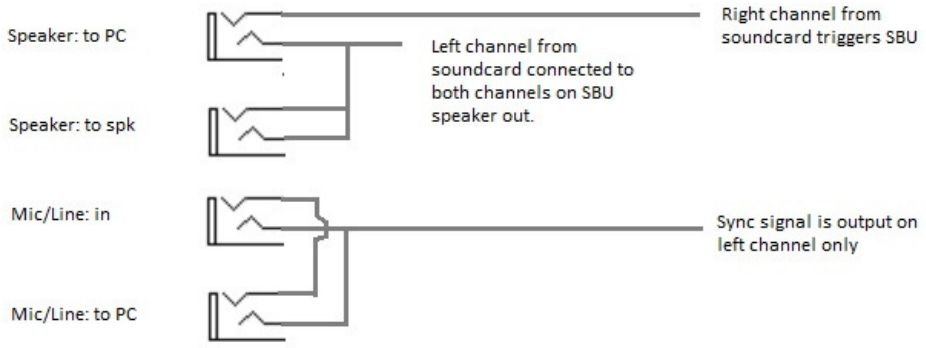
The PC produces an audio tone. That triggers the Sync-Bright-Up. The SBU puts a bright square on the video and produces an audio tone added to one of the microphone channels. That tone on the audio input is used to sync the video and audio. It can be superimposed on the same channel as the microphone input or on a separate channel.



Video Sync-Bright-Up soundcard/ADC

The PC produces an audio tone. That triggers the Sync-Bright-Up. The SBU puts a bright square on the video and produces an audio tone which is sent to the multichannel Analogue to Digital Converter (ADC) card in the PC. The microphone input is also sent to the multichannel ADC. All multichannel data is always synchronised.





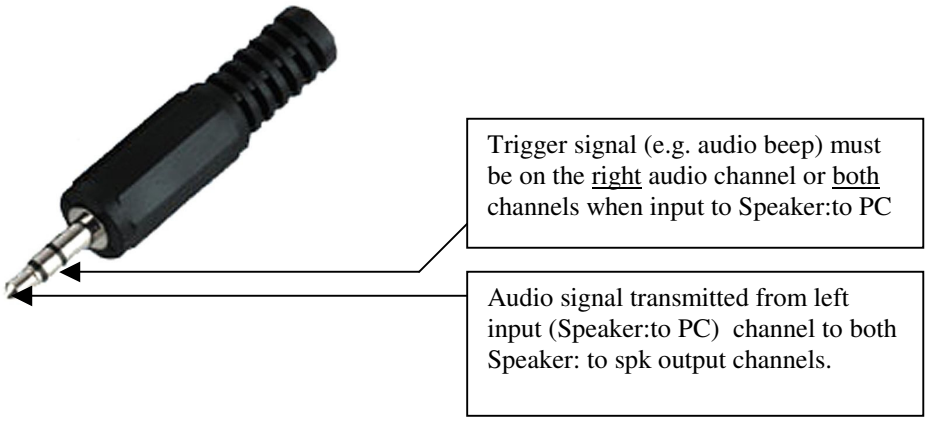
Triggering the SBU

The duration of the trigger signal should be at least 20 microseconds. Once triggered, the sync output goes into a loop for

around 180 horizontal sync cycles and once it comes out of that loop if the trigger is still high it will retrigger so the upper limit on the length of the trigger pulse is about 300ms. The amplitude of the trigger signal should be at least 1.55V [this usually equates to soundcard levelset at about 30% so set the output to about 40% to ensure triggering from this source.

The SBU is **triggered by the right audio channel only** and the left audio channel passes through the SBU to the speaker output unchanged and presented as mono to both left and right speakers/earphones. This means you can play audio prompts on the left channel without it triggering the SBU and the participant will only hear the prompt as a mono signal played though both headphone channels and not hear the trigger beep.

NB. If you want to use audio prompts in AAA then record them on the left channel ONLY to avoid triggering the SBU with the audio prompt.. If you want the participant to hear the trigger beep then record it on both channels otherwise record it on the right channel only.



NB: If audio beep input to *Speaker:to PC* socket is present on the left channel (tip of connector) but NOT on the right channel (ring of the connector) then the SBU will not trigger.

The audio sync signal

Because the SBU produces a **sync pulse signal only on the left output channel**, if recording stereo, the right channel will not have the sync signal mixed into it. Useful if the trigger occurs while the participant is talking.

Technical Details

Specifications

SyncBrightUp Unit

Power Supply	3V dc (2x AAA batteries)
Power Consumption	50mW
Sync signal	headphone level
Case Dimensions	H26 x W56 xD110
Weight	0.120kg
Serial Number	_____

General Environmental

Temperature (Operation)	+10 to +40℃
Temperature (Storage/Transport)	-15 to +60 ℃
Humidity	No Condensation 30 to 70%

When the PIC circuit receives an audio signal from the PC it performs the following actions:

- wake from SLEEP
- switch on power to the sync separator and oscillator
- wait a few mSec
- for 100mS,
    - send a pulse to the SyncBrightUp circuit to make a bright square
    - send a 1kHz tone to the PC audio input to sync the system
    - flash the LED to show that the circuit is working
- switch off power to the sync separator and oscillator
- go to SLEEP

The PIC wakes from SLEEP when it receives a signal greter than 130mV at its comparator input. The comparator is comparing the audio input with 130mV from a potential-divider.

There is no off-switch. When the PIC is in SLEEP mode, it consumes around 20uA. A pair of 1175mAh AAA Duracell cells will last longer than their shelf life of 5 years.When receiving a tone on the mic/line input channel, 2 frames (= 4 de-interlaced frames) of video have a bright square are superimposed in the top right-hand corner. At the same time 4 2kHz tones are superimposed on the mic/line output. For 250mS following the 4 tones, VSync pulses from the video channel are mixed into the audio signal mic/line output. The PC can then sync its audio and video streams by aligning the four de-interlaced frames with bright-up squares with the four 2kHz tones. It can also estimate the video frame rate by examining the VSync pulses during the following 250mS.

A typical audio recording looks like this:

There is some noise at the beginning as the sync-separator turns on. There are 4 bursts of 2kHz for the 4 bright-up (de-interlaced) frames. There are then approximately fourteen VSync pulses and some noise as the sync-separator turns off.

NOTE: There is no off-switch. When the unit is in SLEEP mode, it consumes around 20uA. A pair of 1175mAh AAA Duracell or equivalent cells will last longer than their shelf-life of 5 years.

Electrical Safety

The SyncBrightUp unit should not be placed in contact with any high voltage device when in use.

Troubleshooting

Problem – SBU does not respond to beep from AAA software i.e the power light does not flash on.
Solution – The SBU only responds to a reasonable audio level. Try increasing the speaker volume in the Windows audio mixer.

Contact

If you are experiencing problems with the hardware or software which are not covered in this manual, you can contact

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Revisions

Revision	Date	Notes
1.0	07.01.11	Initial manual
1.1	03.07.13	More technical details added

