

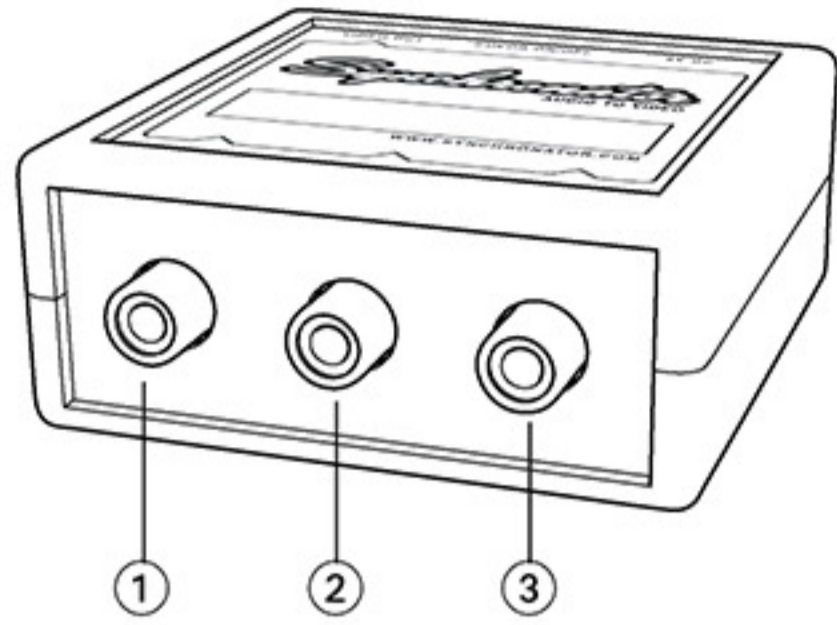


Manual for model\_01, September 2009  
 SYNCHRONATOR is a project by  
 B VAN KOOLWIJK and G J PRINS  
 www.synchronator.com

Specifications	
Power rating:	6V DC / 120 mA
Output:	Composite video
Video standards:	PAL, NTSC

## INTRODUCTION

The SYNCHRONATOR device adds video sync pulses and color coding signals to your audio input, thereby effectively disguising the audio as a composite video signal, compatible with all video equipment supporting composite video input.



### ① ② ③ AUDIO LINE INPUTS

To be connected to your audio line outputs. The colors red, green and blue resemble the video color channels onto which your sound will be directed. Mixing equal proportions of the additive primaries results in shades of gray or white. The intensity of the signal is depending on the amplitude of the audio input signal.

### ④ 6V DC

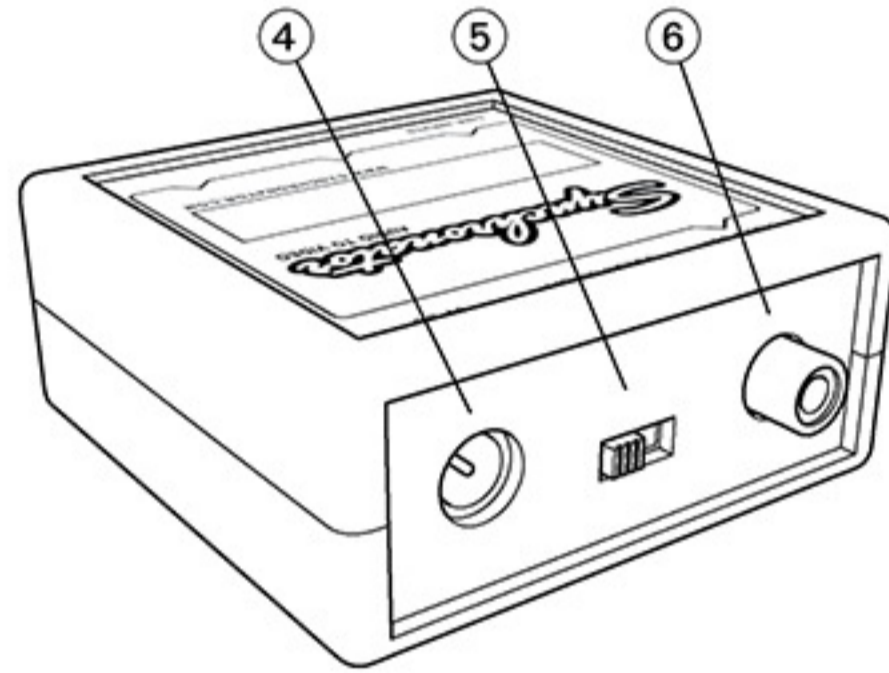
Input for 6V adapter.

### ⑤ COLOR ON/OFF

Switch to enable or disable chroma.

### ⑥ VIDEO OUT

Connect to television with composite video input (preferably CRT), video recording device or projector.



## RGB OPTICAL MIXING / ADDITIVE COLOR

Television and other computer and video displays are an example of the use of additive primaries and the RGB color model.

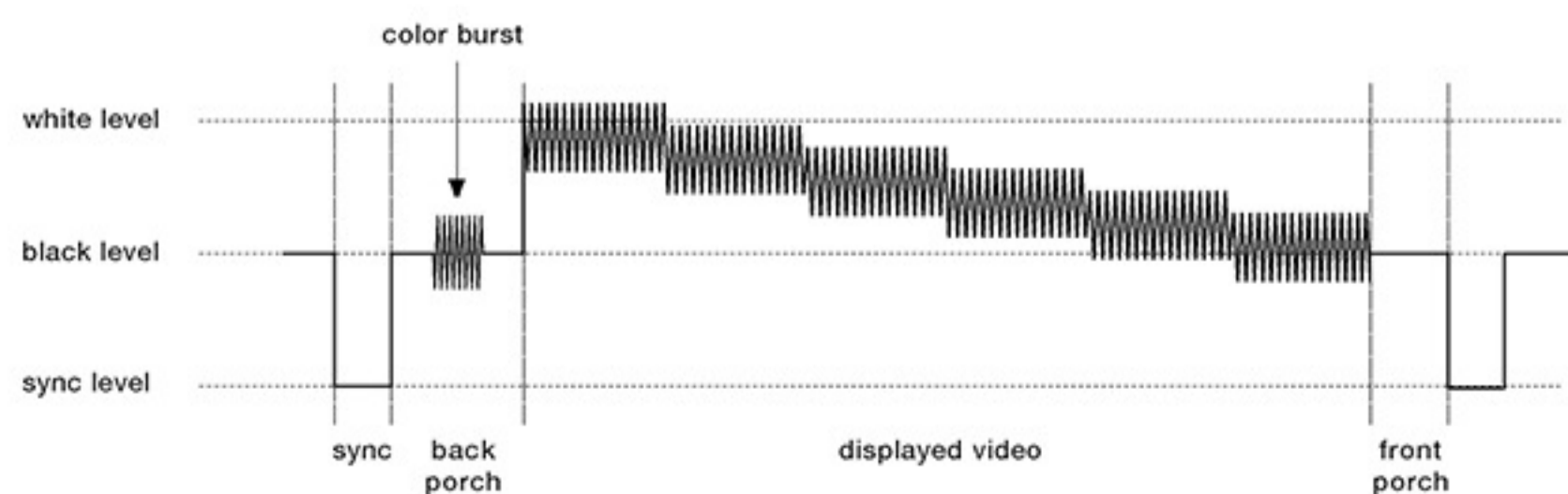
When the intensities for all three components are the same, the result is a shade of gray, darker or lighter depending on the intensity. When the intensities are different, the result is a colorized hue, more or less saturated depending on the difference of the strongest and weakest of the intensities of the primary colors employed.

When less than three audio inputs are in use, a black and white picture can be obtained by switching the color mode off, in which case only the luma (brightness) part of the signal will be active. Note that of the primary colors, green has most brightness. It is therefore the preferred input for a mono sound source.



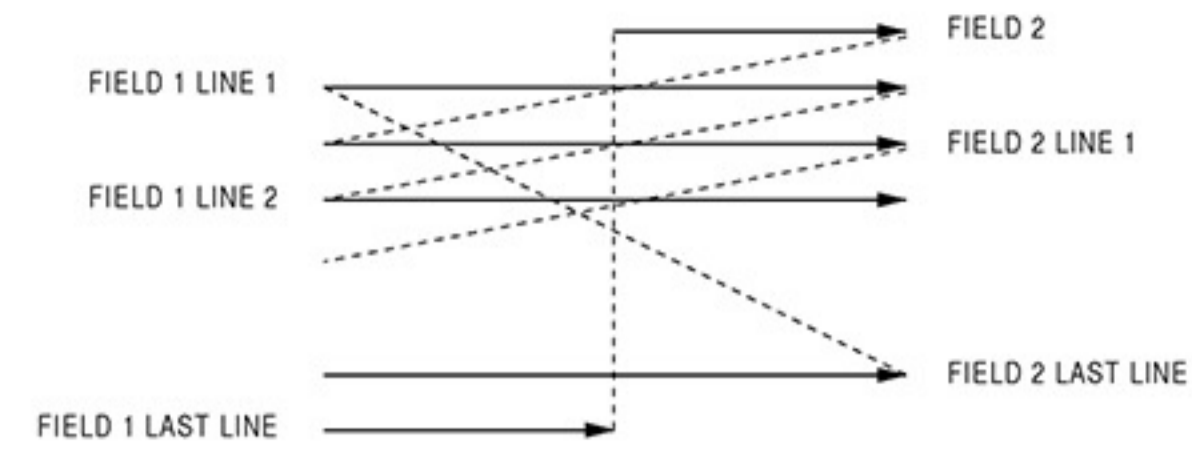
## VIDEO SIGNAL PROPERTIES

	frames/sec.	interlaced	V freq.	H freq.	image size
PAL	25	yes	50 Hz	15625 Hz	768 x 576
NTSC	29.97	yes	59.94 Hz	15734.26 Hz	640 x 480



## INTERLACED VIDEO

— scan line  
 - - - retrace



total number of lines:  
 625 [PAL]  
 525 [NTSC]

## AUDIO TO VIDEO

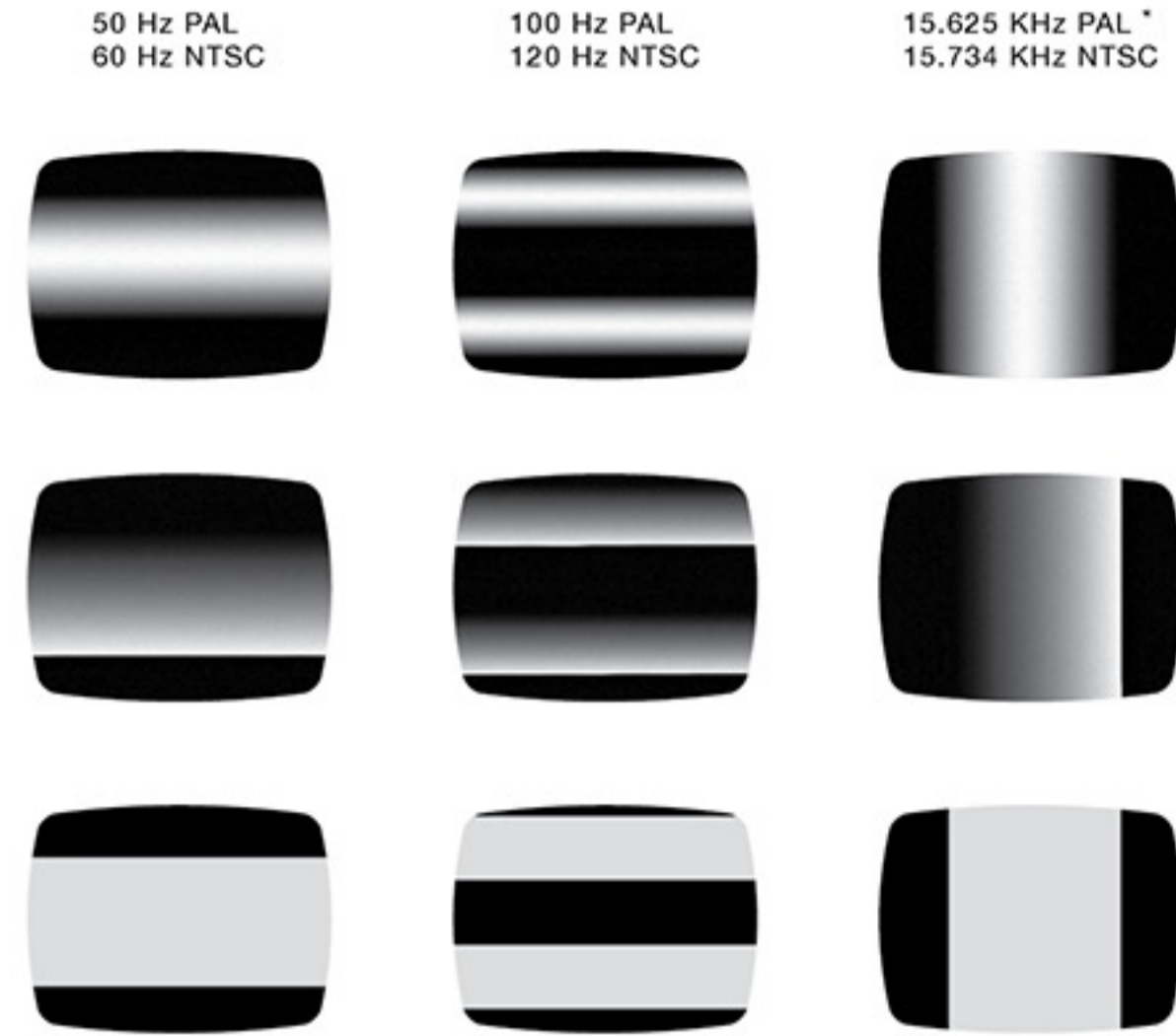
sine wave



sawtooth wave



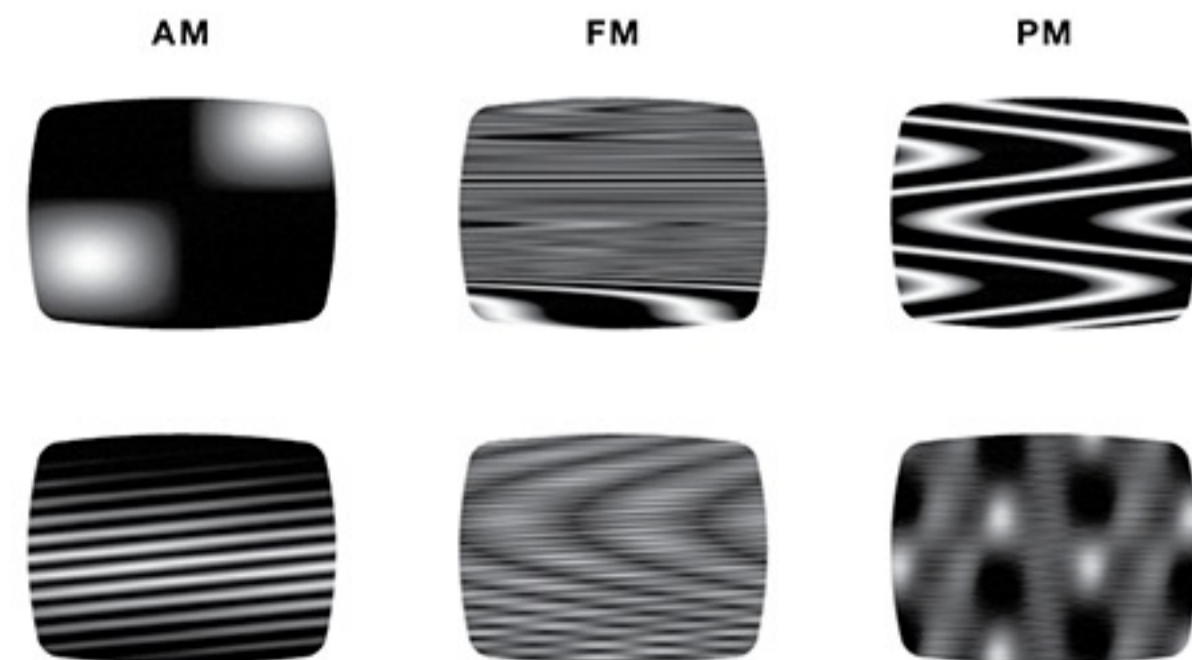
square wave



\* Actual numbers may slightly differ, noticeable especially at higher frequencies.

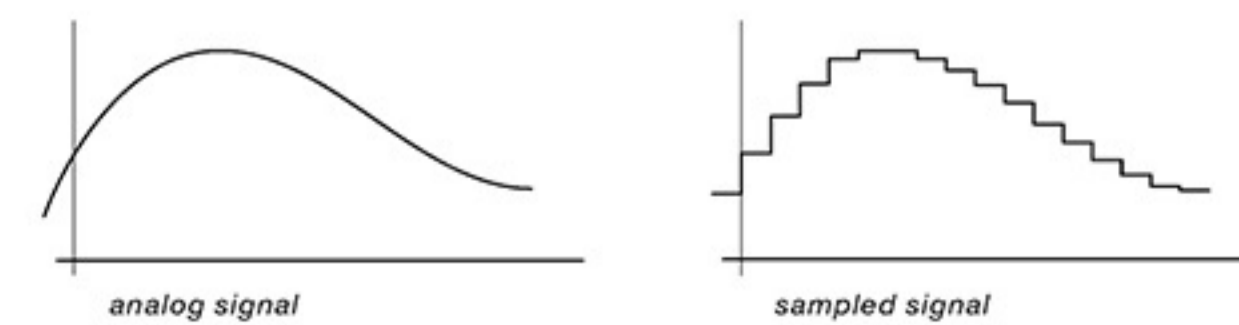
In order to increase the complexity of the visuals, modulation of the audio signal can be useful. Modulation is the process of varying one waveform in relation to another waveform.

AM - Amplitude modulation, whereby the amplitude of the modulated signal is varied.  
 FM - Frequency modulation, whereby the frequency of the modulated signal is varied.  
 PM - Phase modulation, whereby the phase shift of the modulated signal is varied.



## DIGITAL AUDIO

Although it is recommended to generate audio with analog sources when working with the SYNCHRONATOR, good results can be obtained with digitally generated sound. Since the limitations of digital audio precision easily become apparent when the results are visualized, it is advisable to set the sampling rate as high as possible. Keep in mind that half the sampling frequency equals the cut-off or Nyquist frequency.



## TELEVISION ENCODING SYSTEMS

The SYNCHRONATOR device comes either set for PAL or NTSC format. This setting can be changed by opening up the device and placing or removing two jumpers on the device's circuit board. The concerning pairs of jumper pins are located near the middle of the circuit board. (jumpers on for PAL, off for NTSC)



TVs currently sold in SECAM countries support both SECAM and PAL.

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