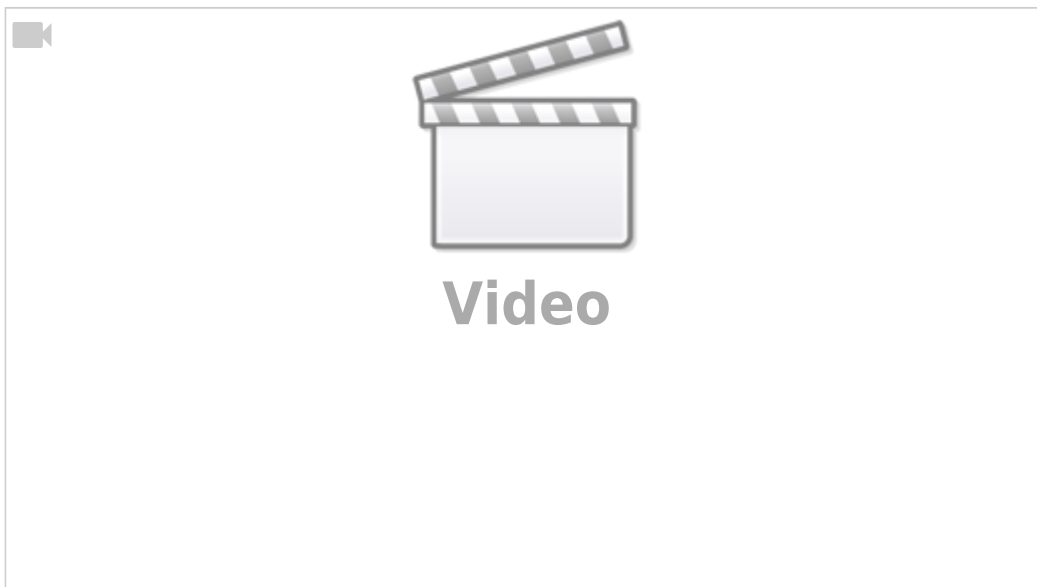


Synchronization of light and sound

Introduction

The question often arises, what if everything is done beautifully, sound with light, together with lasers and video, are connected together. But how to do that? More on that below. The choice of synchronization method depends on the task at hand. For a one-time concert at the box office, it's easier to work with your hands Synchronization makes sense either if it is a stationary venue with a constant set of concert numbers or as part of a city tour with its own permanent set of equipment. those. where repeatability and reproducibility are needed. Of particular note is a complex one-time production show with a large set of various equipment. 

1. all equipment participating in the show can be divided into groups
2. sound (media players, sequencers, mixers, processing)
3. lighting and special effects (equipment controlled by [DMX](#) and Art-Net)
4. laser projectors (control via ILDA from a separate computer)
5. video systems (media players, media servers, DL devices)
6. scene mechanics
7. pyrotechnics
8. fountains



usually each group has its own «control center», although there may be mixed options, for example, the media server and DL can be controlled from a remote control shared with the light via Art-Net, they can also be controlled from it via [DMX](#) pyrotechnics and fountains. There are also other ways to control using Arduino controllers.

Synchronization Methods

Again, there can be several ways to synchronize:

1. Each «control center» contains predefined scenes for its own group of equipment and has the

ability to receive timecode and switch scenes by its own «tags».

2. there is a «master controller», inside which the time code is processed and commands are sent directly to switch scenes using protocols understandable to other «control centers»
3. mixed circuit - part of the equipment is directly subordinate to the time code, the other - to the master controller.

You can use a MIDI sequencer or media player (CD, MD, ADAT, DAW) as a timecode source. i.e. usually the timeline is associated with the audio track of the show. In the case when there is no live performance, you can combine audio and video tracks and play them from the media server. In this case, the light console can work according to the internal time code and control the playback of tracks from the media server (this option can be used, for example, in a show ballet).

«Classic» synchronization option - media player(audio track+timecode source) →(**SMPTE/MIDI**)→ light console → (**DMX, ArtNet**) →light+media server.

Another option for synchronization is when it is based on a laser multimedia show. Pangolin LD2000 software has the ability to control external equipment via **MIDI** and **DMX**. The audio track and ILDA signal are synchronously played by the program, control frames with the commands **MIDI** or **DMX** are inserted into the necessary places of the timeline, which can control moving reflectors, media server, light appliances, fountains.

Also LD2000¹⁾ works with timecode according to **MIDI**.

When it comes to synchronizing a future show, the first thing to think about is the equipment park. If we are talking about constant work in this direction, it may make sense to immediately purchase equipment that was originally designed to work with time code. An attempt to link and synchronize existing equipment with various control methods into a single system is justified only for a one-time event if the budget does not allow for the purchase of the necessary equipment. But in this case, «the tambourine must be kept ready.»

On big shows like Eurovision, the source of timecode is the TCP. Signal format - **LTC**²⁾. Its choice is due to the fact that, unlike SMPTE, for example, it can be transmitted over a simple symmetrical cable (*audio or DMX*) over fairly long distances. The scheme is simple: PTS distributes timecode to all consoles - lights, media servers, even pyrotechnics. At the rehearsal, when everything is already written, they start the timecode and all the console operators record the timecode event (they simply «click» all the cues to bind them to certain timecode frames). Further, the events are arranged in chronological order and the subsequent launch of the timecode will make everything «play». Most consoles accept timecode via the regular MIDI-In input. For PC versions, some (like HOG PC) need a special **MTC** widget.

Center player

The heart of synchronization will be a media player, but the media player is not simple, but with an MTC signal output. That is, the head of our steam locomotive is a media player, it will also give other devices sync time

¹⁾

Lasershow Designer 2000 - creating laser shows

²⁾

linear time code - linear time code

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