Contents

1 Overview

MTCVideoSlave (**M**IDI **T**ime **C**ode **Video Slave**) is a video player which syncs the video playback to MIDI time code.

It uses the *FFmpeg*[1] library for decoding video files and therefore supports numerous file formats. But since not all of these formats are suited equally well for synchronized playback it is sometimes required to transcode the video file into a format suitable for playback with MTCVideoSlave.

By using *OpenGL* for displaying the video the CPU load is kept low and multiple video windows can be shown simultaneously – so you can have a small window on your DAW desktop and a big window on another screen at a remote location for example. You can also use MTCVideoSlave to offload the video playback onto another PC or keep multiple PCs in sync for video installations.

Usually it is best if the video file has the same frame rate as the MIDI time code but this is not a requirement. MTCVideoSlave supports videos with any frame rate and tries its best to accurately keep them in sync. It can even play back the audio track in sync with an external timecode signal (through standard Windows audio drivers or **ASIO**[2]) – the soundcard does *not* need to be hardware/PLL synced to the timecode source.

2 Using MTCVideoSlave

Figure 1: Main Window

First you have to tell MTCVideoSlave which MIDI device to use. You can do this in the Settings dialog (see section 3).

If you don't have MIDI hardware you need additional software such as *LoopBe1*[3] or *MIDI Yoke*[4] which will allow you to connect the output of your DAW to the input of MTCVideoSlave with a "virtual MIDI cable".

To open a video file press `Ctrl`+`O` or select `File` ⟩ `Open...` from the menu at the top of the window. If the file is opened for the first time a seek table has to be built. This may take a few minutes for big videos. Once the seek table has been built, MTCVideoSlave is ready for operation and will keep the video in sync with the timecode received from the selected MIDI device.

☞ Note: When an external timecode is being received and the Sync button is active the internal play and seek commands will be disabled.

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[1]FFmpeg is a trademark of Fabrice Bellard. See `http://www.ffmpeg.org/` for more information.
[2]ASIO is a trademark and software of Steinberg Media Technologies GmbH
[3]`http://nerds.de/en/loopbe1.html`
[4]`http://www.midiox.com/`
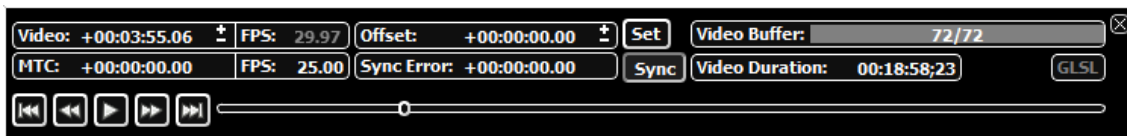
2.1 Controls

Figure 2: Controls Window

Video	Shows the current position in the video stream. The video FPS can be overridden by entering the wanted FPS into the *FPS* field. Fractions like *30000/1001* also work, hover the mouse over the *FPS* field to see the exact value expressed as a fraction. Clear the *FPS* field and press return to reset to the videos original FPS.
MTC	Shows the current MIDI timecode.
Offset	Offset between video and MIDI timecode. Positive values mean the video is ahead of the timecode.
Sync Error	Shows the maximum sync error which happened during playback.
Set	Set Offset from current Video and MTC position.
Sync	Enable/Disable syncing of the video to the timecode.
Video Buffer	Shows the status of the video buffer.
Video Duration	Shows the duration of the video.
GLSL	Indicates if OpenGL shader is used for color decoding.

☞ Note: The *Video* and *Offset* values can be edited with the mouse wheel. Just click into the section you want to edit (hours, minutes, seconds or frames) and scroll the wheel. Double clicking will reset the value to *00:00:00:00.*

2.2 Sync/MTC status icons

If the *current time* overlay is enabled (see section 3) then the sync status (on/off) and the MTC status (running/stopped) are indicated by one of four icons:

Sync off MTC stopped	Sync off MTC running	Sync on MTC stopped	Sync on MTC running
Empty square	Filled square	Empty triangle	Filled triangle

2.3 Seek tables

In order to quickly seek the video MTCVideoSlave has to build a seek table for every video file. This is automatically done when a file is opened the first time and can take some time (usually a few minutes). By default the program does a quick check of the seek table after a new seek table has been built. For correct operation of the program it is essential that the seek table is correct. This can be assured by choosing ⌷Tools ⧽ Check seek table (full)⌷ from the menu.

☞ Note: The seektable is rebuilt automatically if the file size or modification date changes.

2.4 Transcoding videos

For normal usage the *H264* video codec is recommended because it is used a lot and implemented with good performance. For professional use *DNxHD* is recommended over *ProRes* because the performance is better.

If there are troubles with a certain video file (for example seek table cannot be built, seeking is too slow, playback doesn't work, ...) try to transcode the video into another format. Select Tools ⟩ Transcode video stream... from the main menu (this feature is not very well supported however).

First select the source and destination files, then setup the options and click Start.

- **Source:** The source filename.
- **Destination:** Destination filename.
- **Frame rate:** Select the frame rate for the destination file. Possible values are 24, 25, 29.97 and 30.
- **Resolution:** If the video has a high resolution only few frames will fit into the video buffer. With this option you can downsample the video to a lower resolution.
- **Keyframe interval:** Lower values produce bigger files which gives better seeking performance but also increases file size. A value of 1 would be ideal for seeking but will produce big files. The default value of 10 should be suitable for most scenarios.
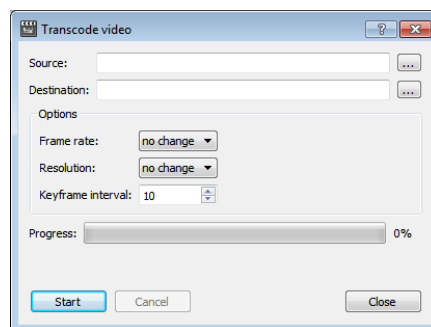
2.5 Log incoming MIDI

Select Tools ⟩ Log incoming MIDI... from the menu to start logging incoming MIDI (you will be asked for a filename to save the log and a tick mark will appear next to the menu item). Select the same menu item again to stop logging.

2.6 Network MIDI device

To keep multiple MTCVideoSlave instances on different machines in sync you can use the *Network MIDI device*. Just select *Network* as the MIDI output device in the master and as the MIDI input device on the slave machines (see section 3.1). Now the slaves will stay in sync with the master.

☞ Note: The MIDI data is broadcasted to UDP port 13203 on the local network. The UDP packets consist of a 16 byte UUID followed by the raw MIDI data.

☞ Note: Please make sure you don't have any firewall active which could block UDP port 13203 and that all machines are on the same subnet to receive the UDP broadcasts.

2.7 Keyboard shortcuts

|	
`Ctrl`+`Q`	Quit
`Ctrl`+`O`	Open video file
`Alt`+`Return`	Toggle fullscreen display (can also be done by double clicking into the window)
`Ctrl`+`N`	Open new video window
`F1`	Toggle sync on/off
`F2`	Show/hide controls
`F3`	Toggle timecode overlay on/off
`F4`	Toggle filename overlay on/off
`F5`	Toggle subtitle overlay on/off
`F6`	Toggle count in on/off
`Esc`	Leave fullscreen display
`Return`	Toggle menubar and statusbar visibility in fullscreen mode
`Space`	Play/Stop
`Page Down`, `Page Up`	Seek 1 frame backward/forward
`Left`, `Right`	Seek 1 second backward/forward
`Down`, `Up`	Seek 10 seconds backward/forward
`Home`, `End`	Seek to begin/end
`Plus`, `Minus`	Audio track volume up/down
`Ctrl`+`Plus`, `Ctrl`+`Minus`	Count in beep volume up/down

3 Settings

3.1 Common

- **Input device:** Select the MIDI input device which should be used.
- **Output device:** Select the MIDI output device which should be used.
- **SysEx Channel:** MIDI SysEx channel to use. 127 is the default channel for global messages.
- **Channel:** The MIDI channel to use. Messages which trigger the count in must come on this channel.
- **Display latency:** Use this setting to compensate MIDI to display latency.
- **Video Buffer:** How much graphics memory to use for buffering the video. If this value is too small only few frames of the video will fit into the buffer, if it is too big the performance might suffer from excessive graphics memory usage.
- **Automatically open last used file on startup**
- **Save all per-video settings into this directory:** If you don't want the per video settings (offset, aspect ratio, ...) to be saved in the same directory as the video file (with the extension `.mtc` appended) select this option to save them all into one directory.
- **Deactivate sync when loading a video for the first time:** Automatically deactivate sync when a video is loaded for the first time.

☞ Note: Incoming MIDI from hardware devices (network is excluded) is forwarded to the MIDI output device. When you play or seek in MTCVideoSlave the corresponding MIDI messages are also sent to the MIDI output device.

☞ Note: For multiple displays with different latencies consider delaying the individual audio paths to get exact audio/video sync on all displays (at the moment setting individual latencies for video windows is *not* supported).

⚠ Warning: Take care not to create a feedback between the MIDI output and input device. This could happen when you connect two machines via MIDI such that both will forward the MIDI messages to the other machine.
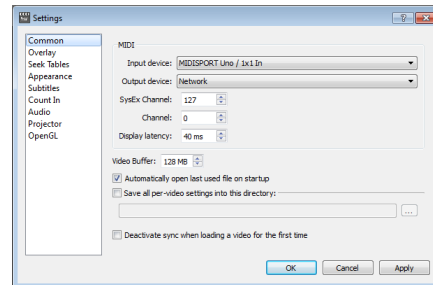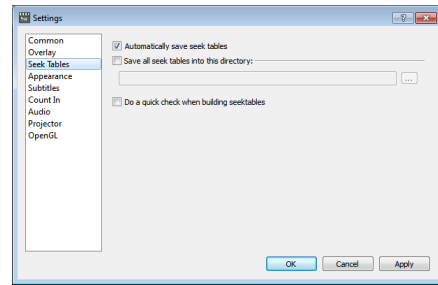
3.2 Overlay

- **Show filename:** Show the filename on top of the video.
- **Show current time:** Whether to display the current time on top of the video.
- **Alignment:** Where to align the overlay on the video.
- **Font size:** Font size of the overlay.
- **Outline:** Width of the outline.
- **Show status messages big and centered:** Status messages, such as *Sync: on/off* are shown bigger. By default they are shown with the style of the *current time* overlay.
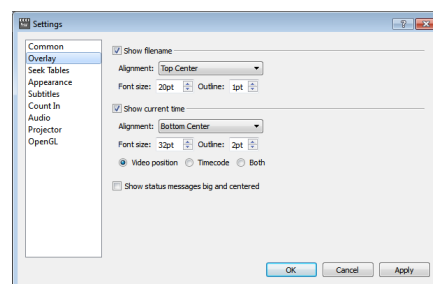
3.3 Seek Tables

- **Automatically save seek tables:** Tells the program to automatically save seek tables so they don't have to be built every time a file is opened.
- **Save all seek tables into this directory:** If you don't want the seek tables to be saved in the same directory as the video file (with the extension `.skt` appended) select this option to save them all into one directory.
- **Do a quick check when building seek tables:** This option is recommended since it is essential for the proper operation of the program that the seek tables are correct.

3.4 Appearance

- **Style:** Choose the style of the controls. You can choose between native look and some other styles.
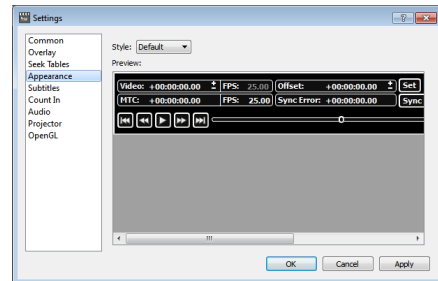
3.5 Subtitles

- **Alignment:** Where to align the overlay on the video.
- **Font size:** Font size of the overlay.
- **Outline:** Width of the outline.
- **Background opacity:** Intensity of the text background.
- **Always use subtitles from this file instead:** Use this option to always load subtitles from a specified file.
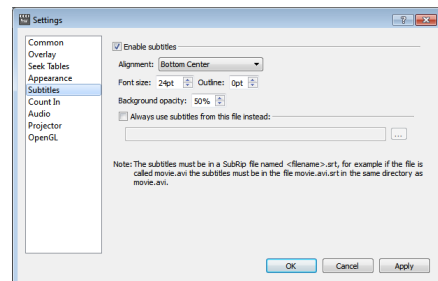
☞ Note: The subtitles must be in a *SubRip*[5] file named `<filename>.srt`, for example if the file is called `movie.avi` the subtitles must be in the file `movie.avi.srt` in the same directory as `movie.avi`. If the provided file is not in *SubRip* format it is loaded as plain text.

☞ Note: When the content of the subtitle file changes the subtitles will automatically be updated. The intended use of this is to have another application update the subtitle file with the text for your speakers while dubbing.

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[5]`http://en.wikipedia.org/wiki/SubRip`

3.6 Count In

- **Alignment:** Where to align the overlay on the video.
- **Font size:** Font size of the overlay.
- **Outline:** Width of the outline.
- **Background opacity:** Intensity of the text background.
- **Duration:** The duration of the Count In.
- **Interval:** Time between clicks.
- **Trigger delay:** Delay between trigger event and Count In (minimum 1000ms).
- **Trigger when TimeCode is received:** Count In will start when incoming timecode starts.
- **Trigger when MIDI message is received:** Choose between triggering on *Note on* or *Control change* messages. You must also enter a value for the Note/Control to trigger on. The following table shows the numbers of the MIDI notes:
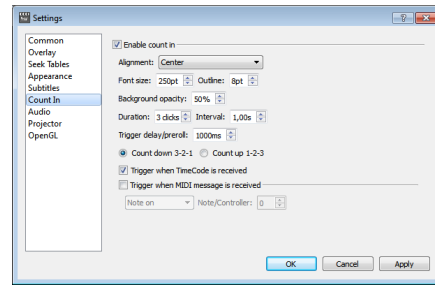
Octave	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
-2	0	1	2	3	4	5	6	7	8	9	10	11
-1	12	13	14	15	16	17	18	19	20	21	22	23
0	24	25	26	27	28	29	30	31	32	33	34	35
1	36	37	38	39	40	41	42	43	44	45	46	47
2	48	49	50	51	52	53	54	55	56	57	58	59
3	60	61	62	63	64	65	66	67	68	69	70	71
4	72	73	74	75	76	77	78	79	80	81	82	83
5	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107
7	108	109	110	111	112	113	114	115	116	117	118	119
8	120	121	122	123	124	125	126	127				

☞ Note: The Count In requires MIDI timecode for timing. This means the Count In sequence will only start when timecode is sent to MTCVideoSlave. When using a MIDI message to trigger the Count In the timecode should already be running (the trigger will timeout when no timecode is received within three seconds after the trigger).

3.7 Audio

- **Audio device:** Choose the audio device to use.
- **Disable ASIO:** Don't query ASIO devices (Windows only).
- **Sample rate:** Sample rate to use.
- **Channels:** Number of output channels to use.
- **Count In Volume:** Volume of the count in beep.
- **Audio Track Volume:** Volume of the audio track from the video file.
- **A/V Latency:** Use this setting to compensate Audio/Video latency.
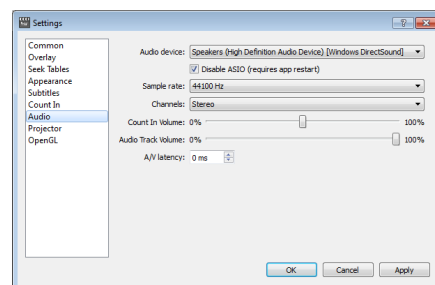
3.8 Projector

- **Hide mouse cursor in fullscreen**
- **Enable perspective correction:** Drag the four points for perspective correction. Double-clicking a point will reset it to the default position. The red lines can be dragged to crop the picture.
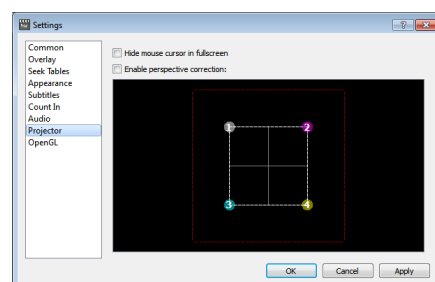
3.9 OpenGL

- **Use non-power-of-two textures:** Saves memory.
- **Use PBO for texture upload:** Better performance.
- **Use shader for color decoding:** Better performance and saves memory. At the moment videos which are encoded in *YUV420P, YUV422P, YUV444P* and *YUV422P10LE* format are supported.
- **Enable VSync if possible:** If you have problems with tearing of the video try to enable VSync. Please note that enabling VSync can have a negative effect on timing and latency compensation.
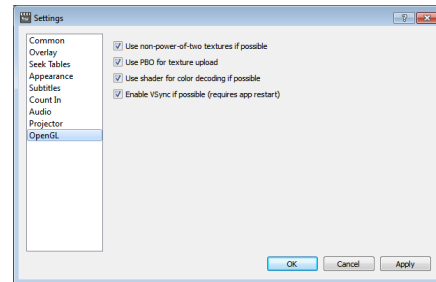
4 Remote control application

MTCVideoSlave comes with a remote control application which can be found in MTCVS' installation directory and is called `remote.exe`.

The following commands are supported:

-list-ids	List ids of running instances
-id [id]	Send command to instance with id (first one by default)
-help	Show help/supported commands of selected instance
-close	Close file
-offset [timecode|set]	Set offset to timecode or current delta between video/mtc pos
-open [filename]	Open file
-play	Play
-pos [timecode]	Set video position
-quit	Quit MTCVideoSlave
-stop	Stop
-subtitle [text]	Set subtitle
-sync [on|off]	Set sync to on or off
-wait	Wait for command completion (i.e. wait for seektable build when file is opened)

By default each instance of MTCVideoSlave will get the lowest unused id in the range $1 - 100$. You can also specify a custom id when starting MTCVideoSlave with the *-id* option like this:

```
MTCVideoSlave.exe −id myid
remote.exe −id myid −open video.avi
```

☞ Note: The remote control program `remote.exe` will only list instances with ids from $1 - 100$, it will not list custom ids outside of this range.