

# Antti Auvinen- Digital Madrigal

Summary of Sound Requirements / 27.9.2022 / timo@kurkikangas.fi / +358 (50) 4144 398

## Note about this technical document:

This document describes the general outlines and should be considered only as overview of the sound-technical requirements for the performance of the *Digital Madrigal* by Antti Auvinen. For each production of the piece in different venues the details of the implementation will be fitted according to the properties of the venue and the resources of the organization. ***The author of this document can give a venue-specific estimation of the requirements for the implementation upon request.***

## The instrumentation of the piece:

- 2 Flutes
- 2 Oboes
- 2 Clarinets in Bb
- 2 Bassoons
- 2 Horns in F
- 2 Trumpets in C
- Percussion (2 players)
- Midi Keyboard player (video control)
- Strings

*Digital Madrigal* by Antti Auvinen has only 1 movement, but it's divided into 6 parts that are called "Videos" 1 to 6 in the score. It's a composition for Orchestra and video clips including soundtracks controlled by midi keyboard player playing amongst the orchestra as any keyboard player. The basic aesthetic goal for sound image would be to keep the music as naturally acoustic as possible and amplify as little as possible. Treating the video soundtrack as one of the instruments in balance with the acoustical instruments. The balancing of the video soundtracks with the orchestra is delicate subject and requires a sound engineer who is experienced with this type of contemporary music and an implementation plan that takes this in to account. Booking experienced contemporary classical music sound engineer and designer in the early stage of the project is highly recommended for any performance of the piece.

## Contents

1.	Electronic elements of the music .....	3
1.1.	Control of the electronic elements and midi keyboard .....	3
1.2.	Computer equipment and software for electronics.....	4
2.	Amplification .....	6
2.1.	Main PA loudspeakers .....	6
2.2.	Mixer and network .....	6
2.3.	Microphones.....	6
2.4.	Monitoring.....	7
3.	Video projection .....	8
3.1.	Video material, Projection layout and picture source.....	8
3.2.	Projector placement.....	9
4.	Appendixes .....	10
4.1.	Computer connection diagram.....	10
4.2.	Microphone and Line list draft .....	11
4.3.	Stage layout draft .....	12

## 1. Electronic elements of the music

The electronics elements of the piece consist of multiple video clips created by the composer, and which are then played using computer software and controlled by separate musician playing midi keyboard in the orchestra according to the score and beating of the Conductor. Each of the 6 “parts” of the piece use different video material which is then divided into 3 different areas projected behind the orchestra. Each of the areas is using its own video clips and timings and the clips aren’t shared between the areas.

### 1.1. Control of the electronic elements and midi keyboard

Video clips are triggered at the right moment by a midi keyboard player playing on the stage amongst the orchestra according to the score and the conductor beating. The clips are divided into 6 “parts” in the software “patch”. Some of the videoclips start playing when key is pressed on the midi keyboard and keep playing even though the key is released. Some of the clips stop or pause playing when the key is released. This means that the length of the notes is something to focus on while playing the score. Different keys on the midi keyboard are mapped to different video clips. Some clips might be mapped to multiple keys starting from different position of the video or having different key release behavior.

The midi keyboard should be full sized midi keyboard consisting of 88 keys and it might be good to have sustain pedal for the players convenience even though it’s not required. For connecting the keyboard to the Mac computer running the actual software the keyboard should have midi out connections. The actual sounds of the keyboard aren’t used, and they should be turned off and not connected to the audio system. Any midi keyboard brand and model should be good enough for this usage as long as it’s big enough and has required midi connections. The only thing that one should keep in mind is that some midi keyboards send different type of message when key is released. Some of them send “note off” midi message and some of them “note on” with value 0. There might be need for adjusting the “patch” accordingly and enough preparation time should be reserved for testing and confirming the operation between the intended midi keyboard and the software patch that everything works as intended.

Currently the “part”-changes are programmed to midi control 92 to values 0,16,32,48,64 and 80. This can be easily changed from the software running the patch depending on the midi keyboard used and what’s most convenient way of using it. Midi note 21 (A0) is programmed as “All Stop” and it should stop all video playback. Additionally in part 1 the midi note 22 (A#0) is programmed to pause the video clips on “Right” screen area, midi note 106 (a#7) to pause video clips on “Left” screen area and midi note 40 (E2) as “Hard stop all”.

It takes few seconds for the software to preload the video clips for the new part so it’s good habit to press the part change early on. One should emphasize that when changing the part during the performance the sustain pedal or any key shouldn’t be pressed at the same time so that the previous sounds and parts stops as intended and don’t keep playing too long.

## 1.2. Computer equipment and software for electronics

The actual software running the “patch” for the *Digital Madrigal* is QLab. For this a relatively new MacBook Pro laptop or desktop with enough memory and hard disk space for the videos is required. The QLab software can be rented on day-basis from QLab website (<https://qlab.app/>). In most cases it might be also a good idea to prepare a separate backup system if something should happen with the primary during the performance. For Qlab licenses one license is entitled to be installed on primary and backup machines so multiple licenses aren't needed for setting up the backup system.

For the computer a separate USB or firewire audio interface with at least 6 outputs is required. Dante Virtual Soundcard is good option when working with Dante audio network. Considering the requirement for midi connectivity from the midi keyboard on the stage an audio interface can in most cases meet this need of midi connections and a separate midi interface isn't needed. If Audio interface doesn't have midi connections a separate midi interface needs to be made available to connect the midi to the computer. The audio tracks of the video clips are distributed to 3 stereo outputs of the audio interface according to which of the three screens the video is projected to. This way engineer can balance the different audio material during the performance.

Additionally, it's good to note at this point that the computer needs to be connected also to the projection of the Video output of the HD Video clips triggered by the keyboard player. This, and the fact that multiple video clips are played simultaneously, will put some pressure to the performance capabilities of the computer and so for example SSD hard disk is highly recommended.

There shouldn't be any need for sound engineer to operate the computer during the performance but it's still good to plan in such a way that the person can see and react if something would happen with the patch during the rehearsals or performance. This means that the computer should be placed next to the mixer at FOH and all the connections for example from the midi keyboard made available to that position.

For the midi connectivity from stage to the computer in most cases midi-xlr conversion and signal amplifier for long distances (example from JL Cooper) will work well and is reliable. There are also alternatives that work using ethernet cabling or tcp/ip networks.

*For connectivity diagram overview please see Appendix 4.1.*

DigitalMadrigal\_Show\_01.qlab4 — TheShow

**Audition** [no cue on standby]

[no cue on standby]

[Icons: Copy, Paste, Undo, Redo, Play, Stop, Pause, Mute, Solo, Volume, etc.]

Number	Q	Target	Pre Wait	Action	Post Wait	
	▶ Preload 1		00:00.00		00:00.00	⌵
	▶ Preload 2		00:00.00		00:00.00	⌵
	▶ Preload 3		00:00.00		00:00.00	⌵
	▶ Preload 4		00:00.00		00:00.00	⌵
	▶ Preload 5		00:00.00		00:00.00	⌵
	▶ Preload 6		00:00.00		00:00.00	⌵
T1	▶ Part 1 Triggers		00:00.00		00:00.00	⌵
T2	▶ Part 2 Triggers		00:00.00		00:00.00	⌵
T3	▶ Part 3 Triggers		00:00.00		00:00.00	⌵
T4	▶ Part 4 Triggers		00:00.00		00:00.00	⌵
T5	▶ Part 5 Triggers		00:00.00		00:00.00	⌵
T6	▶ Part 6 Triggers		00:00.00		00:00.00	⌵
V1	▶ Videos Part 1		00:00.00		00:00.00	⌵
V1L	▶ Left		00:00.00		00:00.00	⌵
V1C	▶ Center		00:00.00		00:00.00	⌵
V1R	▶ Right		00:00.00		00:00.00	⌵
V2	▶ Videos Part 2		00:00.00		00:00.00	⌵
V3	▶ Videos Part 3		00:00.00		00:00.00	⌵
V4	▶ Videos Part 4		00:00.00		00:00.00	⌵
V5	▶ Videos Part 5		00:00.00		00:00.00	⌵
V6	▶ Videos Part 6		00:00.00		00:00.00	⌵
	▶ STOP ALL (midinote 21)		00:00.00		00:00.00	⌵

No Cue Selected

Edit Show 1378 cues in 1 list [Warning] [List] [Settings]

## 2. Amplification

The goal for the amplification in *Digital Madrigal* is to build the sound image in good balance on top of the acoustical sound of the instruments of the orchestra in the natural acoustics of the venue. The primary requirement is to make the soundtrack from the video clips audible with the orchestra. For coherent sound image a slight supportive general amplification for the orchestra is recommended. This amplification would be as discreet and unnoticeable as possible still making the sound of the acoustical instruments more similar and more present with the fully amplified soundtrack of the video and at the same time also slightly supporting the contemporary playing techniques written in the score for the instruments.

### 2.1. Main PA loudspeakers

In most venues and concert halls a good starting point would be to have a stereo line-array speaker system hanged on top of the orchestra covering the whole auditorium. Many times this is already available by default. In addition to the main line-array system additional fill speakers might be needed to cover some areas of the audience.

For the sound localization purposes and blending the sound image of the video clips with the acoustical sound of the orchestra in most cases it's also good idea to place couple point source speakers on speaker stands amongst the orchestra. These speakers should be considered as "zero-time" speakers and all the other speakers used for the amplification of the video should be delayed to these speakers. Usually these speakers work well also as fill speakers for the audience sitting near the orchestra and as monitor for the conductor and in this case additional fill speakers or monitor speakers aren't needed.

### 2.2. Mixer and network

A professional digital mixer is required for working efficiently during the buildup, rehearsal and performance period. Good options for these are for example Yamaha QL and CL -series mixers and Digico mixers. Also using some digital audio network like Dante or connections like Madi makes it probably faster to do the required connections between the mixer, speakers, microphones and computers. This needs to be discussed case by case according to whose doing the actual sound engineering and what are the resources for the project.

The mixer should be placed in a good listening position amongst the audience and not in any separate booth so that the engineer can easily balance the amplification and video clips with the acoustical sound and react the nuances of the orchestra and piece. Wireless tablet controlling mixer remotely might help to achieve a better end result and lower down the amount of time needed for system adjustment.

### 2.3. Microphones

Even though the main goal and starting point for the amplification is the acoustic sound of the orchestra in the concert hall some discreet and very subtle supportive amplification is recommended. This small amplification brings the orchestra sound slightly more presence and closer to the listener and brings up some nuances of the modern playing techniques of the contemporary classical music. For these purposes and target some general microphones are recommended to be used amongst the orchestra.

Any instrument microphones or miniature microphones attached to the instruments aren't needed.

*For some baseline suggestion and starting point please see Appendix 4.2 for a list of microphones.*

#### 2.4. Monitoring

Depending on the location of the Main PA speakers and whether or not there are point source speakers amongst the orchestra on speaker stands some additional monitor speakers might be needed for the keyboard player and conductor. Usually, a small wedge speaker on the ground next to conductor and keyboard player or for example Genelec speaker on a microphone stand works well for this purpose. Any additional monitors shouldn't be needed.

### 3. Video projection

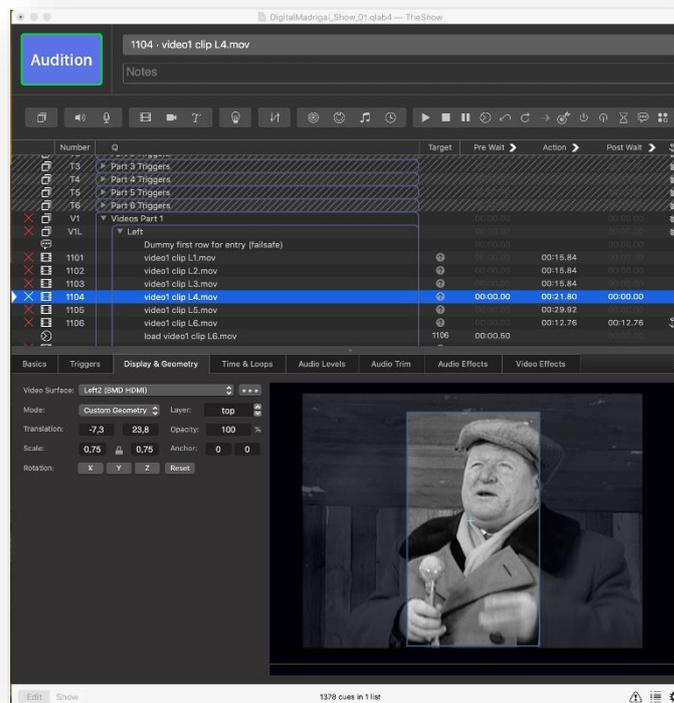
The key component of the electronics in the *Digital Madrigal* are the Video clips prepared by the composer. These clips are projected to three areas behind the orchestra. Each venue and concert hall has different possibilities and optimal solution for this and the implementation for each concert needs to be discussed between the parties.

#### 3.1. Video material, Projection layout and picture source

At the time of writing this document the patch for the Qlab software to perform the *Digital Madrigal* is programmed in such a way that there are 6 “Surfaces” which are all routed to 1 HD projector. This means that there is only one projector required and the picture signal for this is coming from the computer running the Qlab software next to the Mixer.

Depending on the placement of the projector and connection between the video projector and the computer a HDMI-SDI-HDMI converters might be needed. Also A/B video signal switch might be needed if separate backup computer is used. One should give extra attention to keeping the latency of the picture as low as possible and to the synchronization of the video clips audio signal and the picture projected. The overall responsiveness and playability of the midi keyboard part is something that one should focus and pay attention to in technical solution planning. Too big video latency will make it very difficult for conductor and keyboard player to perform the music.

The 6 surfaces will create 3 different projection areas to which the video clips are then distributed: Left, Center and Right. There are two different surfaces for each of the areas for different zoom and cropping requirements of the video clips. Extra time will be required during the buildup period to adjust the surfaces and projection areas.



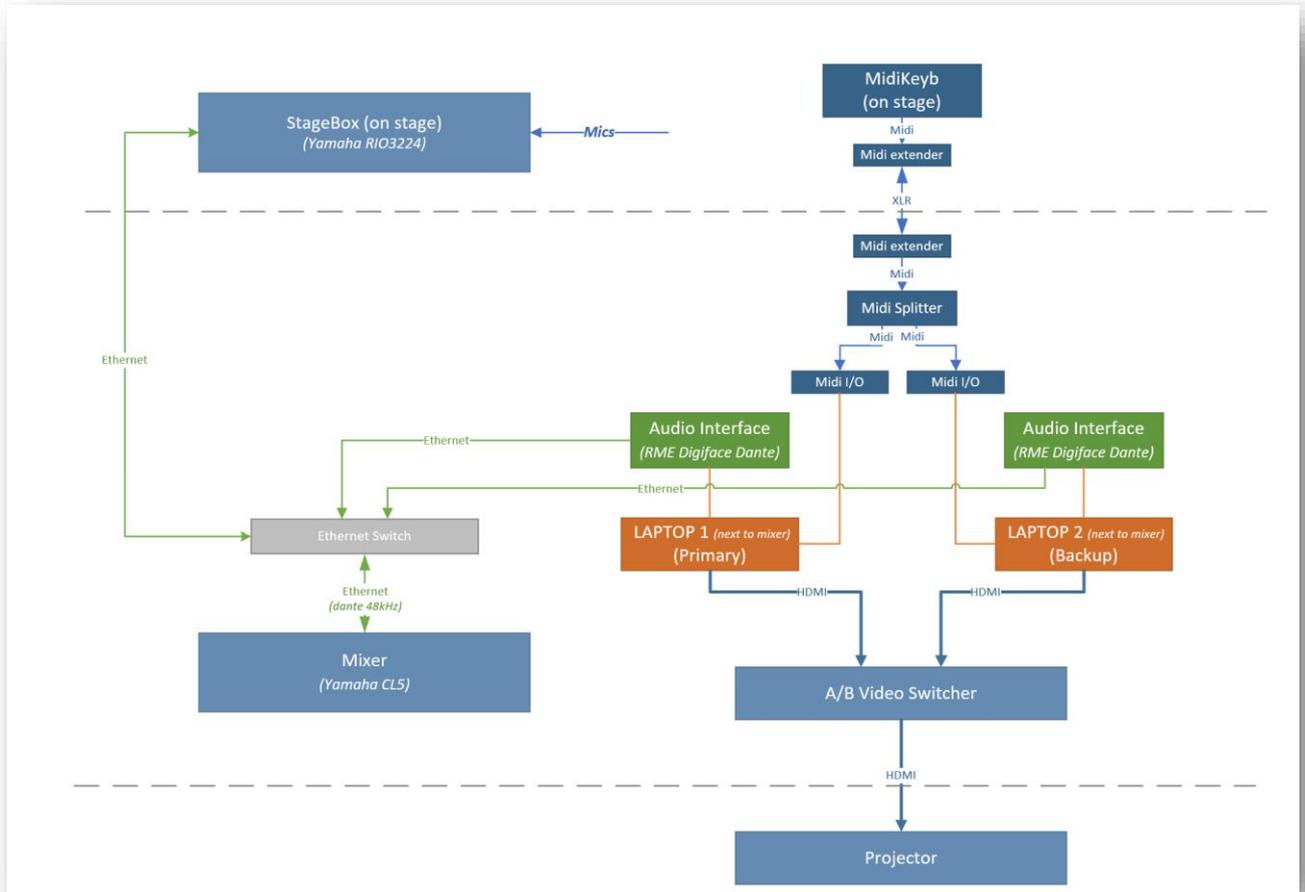
### 3.2. Projector placement

The placement of the projector needs to be discussed separately if there isn't ready solution at the concert hall. In overall the projector needs to be professional video projector for performing arts and have enough brightness to be used in concert situation with the concert lights. Basic presentation or home theatre projector isn't usually sufficient for this. One should also pay attention to the background noise generated by the projector. As we're trying to accomplish acoustical classical music concert one should try to find a solution where the projector is placed on separate room with soundproofing.



## 4. Appendixes

### 4.1. Computer connection diagram





### 4.3. Stage layout draft

