Grand Haven Musical Fountain

Choreography Software User Manual

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GRAND HAVEN MUSICAL FOUNTAIN

Choreography Software User Manual

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Table of Contents

Chapter

1

Chapter 1: Setup and Installation

This chapter is how to setup and install the software for the program. All of the requirements for the software and how to obtain the correct version of Java used in this software are in this chapter. Step-by-step instructions are included on how to install this software and Java 8. After completing this chapter, the software will be ready to use.

System Requirements

Windows

- Windows 8 (Desktop)
- Windows 7
- Windows Vista SP2

  Note: Windows XP not supported for Java 8

  Minimum Requirements
  - RAM: 4 GB
  - Processor: 1.8 GHz
  - Disk space: 500 MB

  Recommended Requirements
  - RAM: 6GB
  - Processor: 2.5 GHz
  - Disk space: 500 MB

Mac OS X

- Intel-based Mac running Mac OS X 10.7.3 (Lion) or later.
- Administrator privileges for installation

  Minimum Requirements
  - RAM: 4 GB
  - Processor: 1.8 GHz
  - Disk space: 500 MB

  Recommended Requirements
  - RAM: 6GB
  - Processor: 2.5 GHz
  - Disk space: 500 MB

Linux

- Oracle Linux 5.5+
- Oracle Linux 6.x (32-bt)*, 6.x (64-bit)**
- Red Hat Enterprise Linux 5.5+, 6.x (32-bit)*, 6.x (64-bit)**
- Ubuntu Linux* 10.04 and above

Minimum Requirements

- RAM: 4 GB
- Processor: 1.8 GHz
- Disk space: 500 MB

Recommended Requirements

- RAM: 6 GB
- Processor: 2.5 GHz
- Disk space: 500 MB

*Not certified on Oracle VM

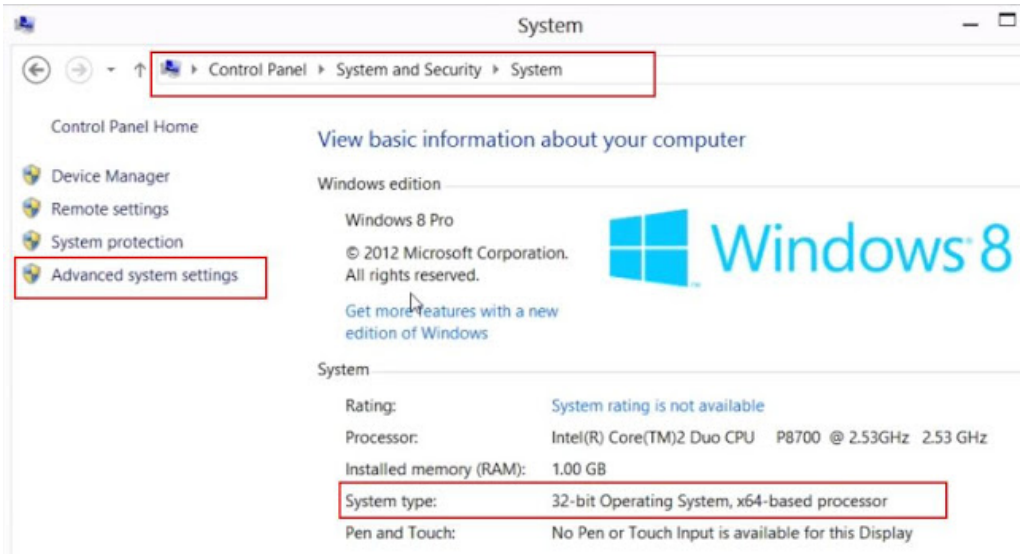
**Not certified on Oracle VM. Only 64-bit JVM is certified.

Other Requirements

Download and install Java 8. (Instructions on following page)
Mouse with a scroll wheel

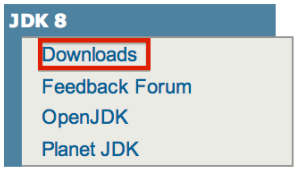
How to Install Java 8 on Windows

Step 1: Open Control Panel and navigate to Control Panel > System and Security > System then select Advanced system settings and determine the system type



Windows 7 or older: Right click on my computer then select properties

Step 2: Go to https://jdk8.java.net/ and click on downloads



License Agreement:

You must accept the Early Adopter Development License Agreement for Java SE to download this software.

Accept License Agreement Decline License Agreement

Documentation

- JDK Docs (84.18 MB zip | HTML)
- JavaFX Docs (5.64 MB zip | HTML)
- Supported Platforms*

Platforms		JRE	JDK
Windows (WinXP not supported)*	32-bit	exe (md5) 29.66 MB	exe (md5) 109.62 MB
	64-bit	exe (md5) 32.54 MB	exe (md5) 113.08 MB
Mac OS X	64-bit	dmg(md5) 56.59 MB	dmg (md5) 163.17 MB
Linux	32-bit	tar.gz (md5) 55.43 MB	tar.gz (md5) 110.53 MB
	64-bit	tar.gz (md5) 54.37 MB	tar.gz (md5) 109.49 MB
Linux ARMv6/7 VFP, HardFP ABI	32-bit		tar.gz(md5) 83.46 MB
Solaris SPARC	64-bit	tar.gz (md5) 50.32 MB	tar.gz (md5) 95.54 MB
Solaris	64-bit	tar.gz (md5) 47.96 MB	tar.gz (md5) 93.16 MB

Step 3: Accept the license agreement and download the JRE for the computer platform

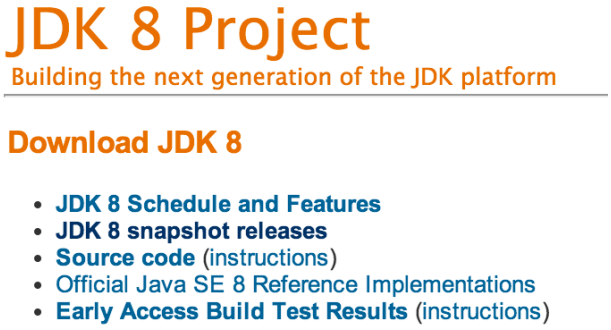
Step 4: Open the installer and click Install

Step 5: Wait for the installer to finish

Step 6: Close the installer

How to install Java 8 on Mac:

Step 1: Go to https://jdk8.java.net/ and click on downloads



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	64-bit	tar.gz (md5) 54.37 MB	tar.gz (md5) 109.49 MB
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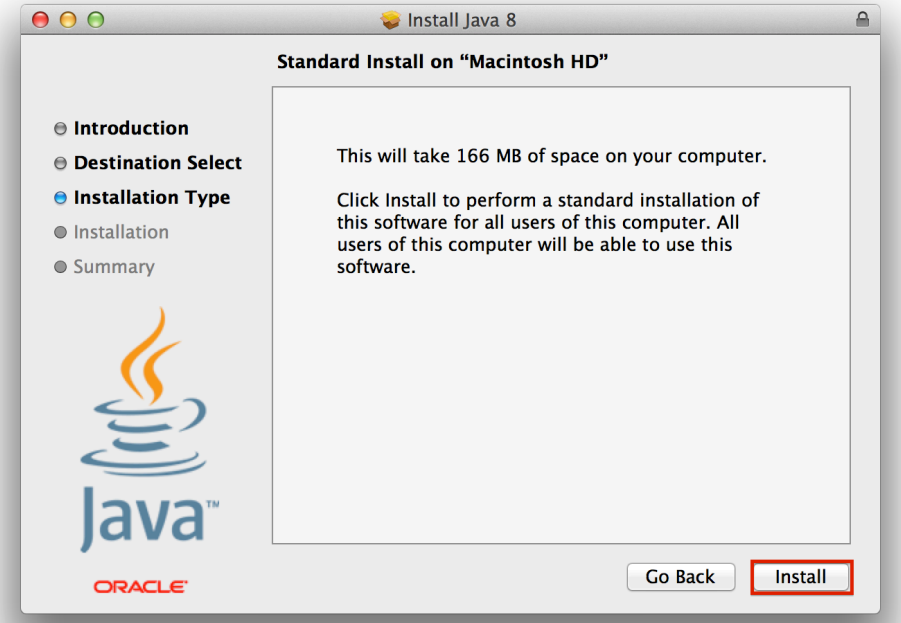
Solaris	64-bit	tar.gz (md5) 47.96 MB	tar.gz (md5) 93.16 MB

Step 3: Open the installer then click Continue

Step 4: Click Install



How to Install The Choreography Software

Double click the icon for the program and the program will open.

Chapter 2

Chapter 2: Choreography Software

This chapter is about the different parts of the interface. This chapter will be able to be referenced for anything regarding the interface and what each feature does throughout the software.

A list of the different parts of the interface in the order they appear in the chapter.

- Simulation Window
- Sliders
- Water Timeline
- Sweep Controls
- Media Player
- Color Palette
- Light Timeline
- Special Operations

Simulation Window

The Simulation Window demonstrates what the audience will see while the show is playing at the fountain. Every change in water level or color will reflect in the Simulation Window.

Music Player

The Music Player is located in the middle of the choreography interface. The Play button will play the song that is currently selected. While the song is playing the Play button will change into a pause button. The Reset button will stop the song if it is playing and return to the beginning of the song. Pressing the "Enter" key will play and pause the song. Pressing the "Esc" key will reset the song.

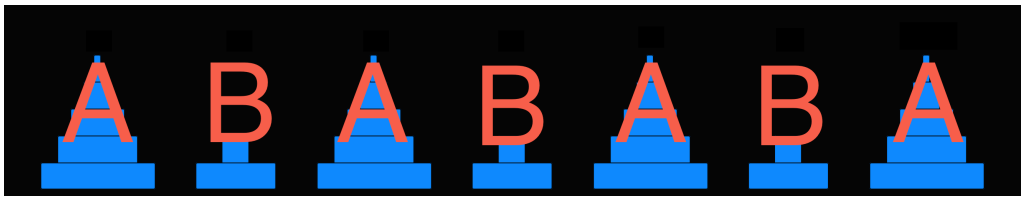
Just below the media buttons is the name of the currently selected song. If there is no song currently selected, "No Music Selected" will be displayed. To the right of the buttons is the timeline for the song. Just under the timeline for the song is the slider for selecting a time in the song. To the left of the slider is the count down timer, once the song has finished the timer will show "0".

Sliders

Each slider controls a specific aspect of a water feature. The sliders have a value from 0 to 5 indicating the level in which the water will rise to.

Rings

The rings are water features that are arranged in a line along the length of the musical fountain. There are 7 ring features connected in 2 groups. From left to right the water features are labeled in either A or B groupings. There are 4 fountains in the group A and 3 that are in the group B. Each group is on a separate circuit for controlling.



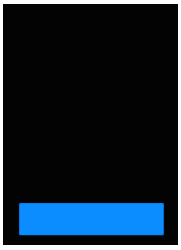
Every ring feature within this formation has 5 rings associated to it that the choreographer can change independently from the other rings. The sliders labeled Ring 1 through Ring 5 control these rings within the groups of fountains. The sliders are labeled group A and group B representing the different groups in the ring features.

The rings each have a level setting that can be set. The different levels depict the height of the fountain during the show. The fountains can be set from 0 to 5, where 0 is off and 5 is full strength.

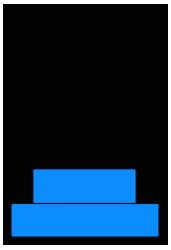
Multi

The multi sliders control the ring formations in the respective group all at the same time to create different formations with the rings. The sliders have values from 0 to 6.

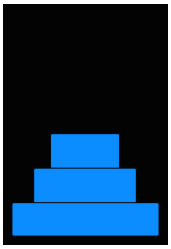
- When the multi slider is at 0, the sliders do not affect the show at all.
- When the multi slider is at 1, ring 1 will be set to level 1.
-



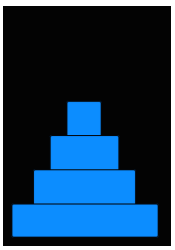
- When the multi slider is set to 2, ring 1 will be set to level 1 and ring 2 will be set to level 2.



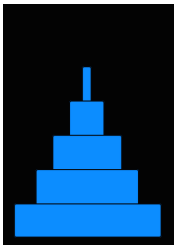
- When the multi slider is set to 3, ring 1 will be set to level 1, ring 2 will be set to level 2, and ring 3 is set to level 3.



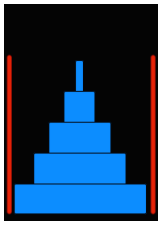
- When the multi slider is set to 4, ring 1 will be set to level 1, ring 2 will be set to level 2, ring 3 will be set to level 3, and ring 4 will be set to level 4.



- When the multi slider is set to level 5, ring 1 will be set to level 1, ring 2 will be set to level 2, ring 3 will be set to level 3, ring 4 will be set to level 4, and ring 5 will be set to level 5.

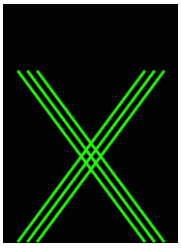


- When the multi slider is set to level 6, ring 1 will be set to level 1, ring 2 will be set to level 2, ring 3 will be set to level 3, ring 4 will be set to level 4, ring 5 will be set to level 5, and the sweeps will be set to level 5 and vertical stationary.



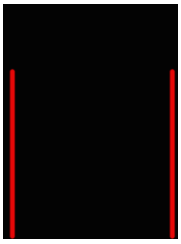
Candelabras

The candelabra sliders control the water feature that is arranged in the formation of a candelabrum. These are jets of water that form in front of the ring formations.



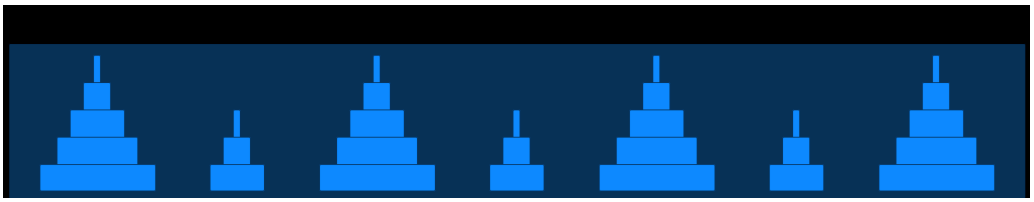
Sweeps

The sweeps are jets of water on either side of the ring formations that move from side to side. The height of the sweeps can be adjusted with the sweep sliders.



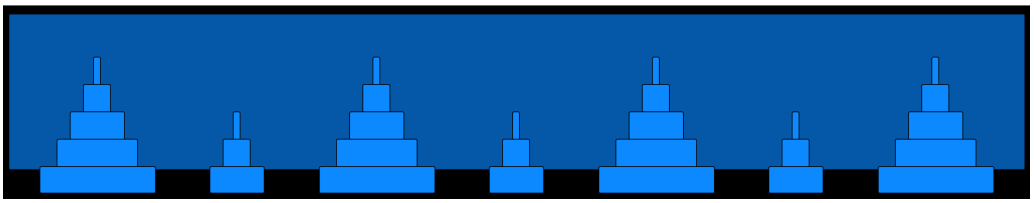
Ft. Curtain

The Front Curtain is a line of multiple jets of water that rise up in front of all of the water features. Pictured is the Front Curtain at level 5 with some ring features in the background.



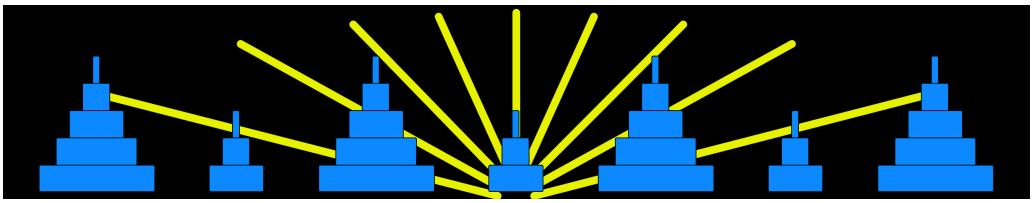
Bk. Curtain

The Back Curtain is a line of multiple jets of water that rise up in back of all of the water features. Pictured is the Back Curtain at level 5 with some ring features in the foreground.



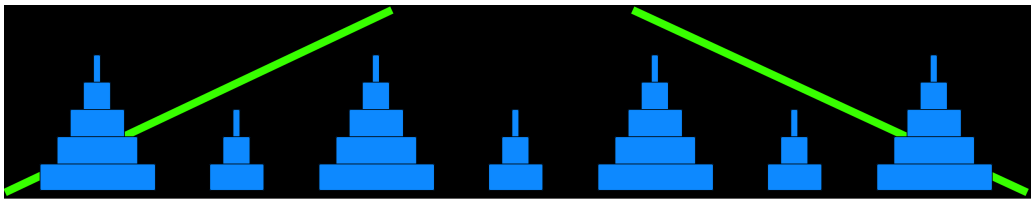
Peacock

The Peacock is a water feature that is a line of water jets that is behind all of the water features. Each jet in the line is angled in a way to make the water "fan out" from a central point. Pictured is the Peacock at level 5 with some ring features in the foreground.



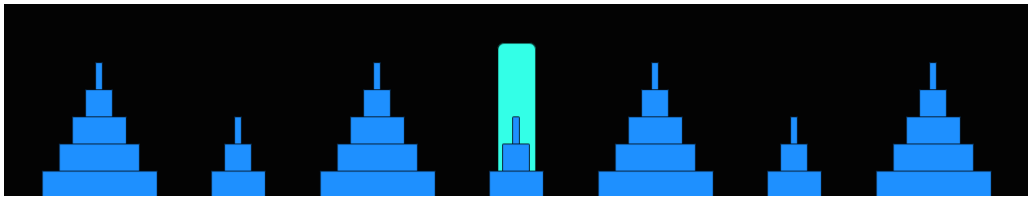
Bazooka

The Bazooka is a set of 2 large water jets that arc from either side across the entire fountain show. Pictured is the Bazooka at level 5 with some ring features in the foreground. The Bazooka's color is derived from ring formations 1-3 and 5-7 (all but the center formation).



Spout

The Spout, also known as the voice, is a large single jet of water that rises from the center of the fountain show. The large jet of water shoots straight up from the center of all of the water features in the show. Pictured is the Spout at level 5 with some ring features in the foreground.



Color Palette

The Color Palette is located at the bottom of the choreography screen. Color can be selected to change the lights to any color at any given point in the show.

The Color Palette is able to define different colors if a color is not present within the given 16 preset colors. Custom colors may be defined to use throughout the show. An additional 16 colors for the show may be defined. Keep in mind some colors do not show up great during the show. Pictured is the default color palette.

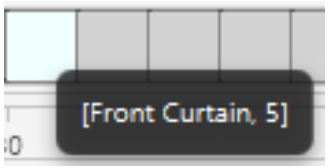
Water Timeline

The water timeline controls all of the water commands for the show. The timeline consists of a single channel for the entire show. Each square represents a 1/10 second of the show. Once a water command is issued, the

fountain will continue that command until it receives a command to turn off the water feature. There is no need to continue the commands for each square.

The Water Timeline indicates there is a command at that moment in time by coloring the time squares a different color from the rest of the timeline. When you hover over the time square, a tool tip will show what commands are currently being sent at that time. When you click on a moment in time in the Water Timeline, the progress slider will advance to that moment in time and the sliders will adjust to the commands being sent.

With this example, the slider for the front curtain will be moved to level 5 at that moment in time in the show.



Light Timeline

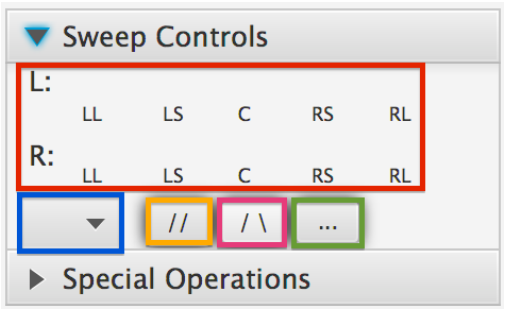
The light timeline controls all of the lighting commands for the show. The timeline consists of all the different channels that are available in the fountain. A line in the light timeline indicates each discrete channel. Every block in the line of the channels indicates 1/10 second for the song.

Sweep Controls

The Sweep Controls modify how the sweeps will act while the sweeps have a water level assigned to them. The sweeps are capable of being controlled through the different channels, A or B (Left or Right).

The Sliders control the distances the sweeps will traverse. The sweeps have 5 different settings they can be for the distance traveled. The different distances are “Left Long” (LL), “Left Short” (LS), “Center” (C), “Right Short” (RS), and “Right Long” (RL). The sliders are split into the separate channels. In the picture the A group sweeps would go from center to right short and the B group would go from left long to right short.

The buttons under the sliders are for the formations the sweeps will be in while moving. The sweeps can be Parallel [//], where the sweeps will move in sync with each other, Opposed [/ \], where the sweeps will move opposite of each other, or Independent […], the sweeps can be set to different speeds, travel and level.



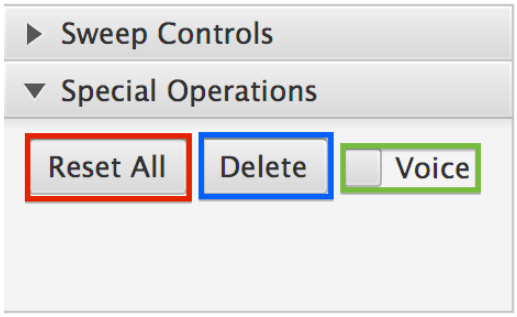
The Speed Control is used to control the speed of the sweeping motions. The different sweep speeds are; “Allegreto”, “Playpause”, “Offreset”, “Largo”, “Andante” and “Presto”.

The height of the sweeps can be controlled with the sweeps sliders to the right of the sweeps control box.

Special Operations

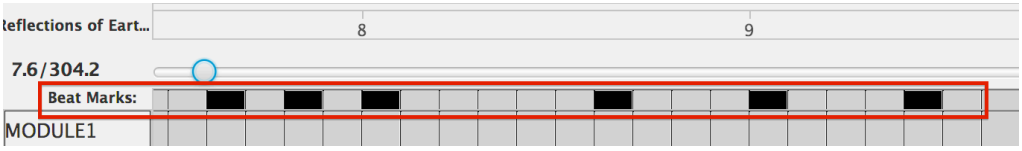
The Special Operations are for controlling the special features the water fountain can do or for editing the water or light timelines.

The Reset All button will reset all of the light timeline and water timeline commands. The Reset All will send the code 099-000 command to the fountain. The Delete button will delete the selected commands in the light timeline. The Voice selection will operate the spout. When the Voice is selected the spout will turn on and when it is not selected the spout will not be on.



Beat Marks

Beat marks are used to mark different places in the show for future editing. While the song is playing, use beat marks to mark the different places in the song where there is a beat that would be best emphasized. To use the beat marks, while the song is playing, tap the space bar for all of the areas there should be an action. The choreography software will save this location in the song and mark where the space bar was pressed. This is useful for finding the areas in the song where to start different water features or change the colors of the water features. The beat mark timeline is located just above the light timeline. Pictured is the beat mark timeline with a few marks in it.



Beat marks will be saved within the ctl file for future use. Beat marks permanent.

GHMF File

The GHMF file (Grand Haven Musical Fountain) is a zipped file of everything that was produced from the choreography software. The GHMF file contains the CTL file, Music file (.wav), marks file and the color map used throughout the show. All of these files are saved within a zip file for future use.

Chapter 3

Chapter 3: First Steps

In this chapter all the different functions of the software will be outlined and a step by step (with pictures) will be shown. All of these functions will be what a typical user is able to do.

Load a GHMF File

The GHMF file contains all of the needed files for the Choreography Software. Within the GHMF file is the DMX color map, CTL file, song wav file and the beat marks file. Loading this file is a one step ability to get an entire show loaded. (See step-by-step tutorial on page 25)

Load a Song

Any music choice may be loaded into the choreography software. The song must be in the .wav file format. Only one song per show may be loaded into the program, to have a compilation of more than one song per show the songs must be edited using an editing program to combine the songs. To load a song into the program open the "File" menu and select "Open Music" and select the song to use. (See step-by-step tutorial on page 26)

Load a Map File

The choreography software uses color map files for custom defined colors. These map files contain all of the colors and their mappings for the program. To continue using custom colors from a previous session load a map file. (See step-by-step tutorial on page 27) Loading a map file is optional, if no map file is selected, the default map will be used.

Load a CTL File

The choreography software can open a show that has been worked on previously by loading the .ctl file. In order to continue working on a show, the .ctl file must be loaded into the Choreography software. To do this open the "File" menu and select the "Open CTL" option then navigate to where the file was saved and open it. (See step-by-step tutorial on page 28)

When loading a legacy CTL file the color palette will be in an indeterminate state and the file will not be able to be edited. This is for viewing purposes only! If loading a legacy CTL file do so at your own risk.

Save a Show

Once a show has been edited or created, the show should be saved. To do this open the "File" menu and select the "Save GHMF" option, then navigate to where to save the show. (See step-by-step tutorial on page 29)

Quit the Program

To exit the program, go to the "File" menu and select "Quit".

Advanced Function

The advanced function will allow a greater number of channels for the show to be edited. This function will add more channels to the software.

Copy a Section of Commands in the Water or Light Timelines

Sections of commands may be copied in the water or light timeline. Quickly and easily use those commands for another part of the show. (See step-by-step tutorial on page 30)

Important note: Do not drag off the timeline while selecting squares and only select squares forward in time (do not backtrack). Do not draw backwards at any point in time. The selection will auto-fill to select in a rectangle formation.

Paste a Copied Section of Commands in the Water or Light Timelines

Once a section has been copied from the water or light timelines, the paste option is available for another area in the respective timeline. (See step-by-step tutorial on page 31)

Using the Music Player

The music player plays the song that you are creating a show to. The music player has 3 primary functions, to play the audio, to match the timelines to the appropriate time in the song and to show how much time is left in the song. The music player has a timeline with hash marks above it. These marks each represent 1/10 second where the whole numbers are full seconds.

The slider for the music player is lined up to the point in the song with the scrolling selector. When the song is at 40 seconds the indicator will be at 40 seconds. Advance the song by clicking and dragging this slider to the point in the song that is desired.

The play/pause and reset buttons handle the playing of the music. When the song is stopped the play button is available. When the song is playing the button will change to pause. When pause is clicked, the song will immediately stop and hold position. When the reset button is clicked, the song will revert to the start of the song.

The timer next to the music player is for how much time is left in the song. The timer will show the total length of then song when the slider is pulled all the way to the start and will show zero when the slider is pulled all the way to the end of the song.

Using the Light Timeline

Once a color is selected from the color palette, clicking a time segment in the timeline and the light module will turn on the light to that color.

Using the Water Timeline

To issue commands into the segments of time, select a square and modify the water command sliders above the timeline.

Using the Water Sliders

Each slider controls a separate function of the water show. Each slider has a value starting at zero to the max value for the fountain. There are 21 separate sliders. The first 16 are group-based sliders. There are 2 groups of water controls for the primary fountains. The groups are labeled A and B. There are 7 different ring features with 5 different sized rings radiating outward. When any of the group A sliders are changed, the entire group A fountains are affected.

Group A is comprised of fountains 1,3,5 and 7, group B is comprised of fountains 2,4 and 6 where the ring fountains are numbered from left to right. Each fountain has 5 rings associated. Ring 1 is the largest diameter ring while ring 5 is the smallest ring. Rings 2 through 4 are progressively smaller up to ring 5. Each ring has a setting from 0 (off) to 5 (max height).

The sweeps sliders control the sweeping motion water jets. These jets of water form a sweeping motion in front of the ring formation fountains. These sweeps are controlled via channel A or B as well in the same configuration. There are 2 sweeps per ring formation, one on each side of the ring formation. The sweeps heights are both controlled at the same time for the ring formation with the slider. The sweeps sliders have values 0 (off) to 5 (max height).

The multi sliders control the ring formations in the respective group all at the same time to create different formations with the rings. The sliders have values from 0 to 6.

- When the slider is at 0 the sliders do not affect the show at all.
- When the slider is at 1, ring 1 will be set to level 1.
- When the slider is set to 2, ring 1 will be set to level 1 and ring 2 will be set to level 2.
- When the slider is set to 3, ring 1 will be set to level 1, ring 2 will be set to level 2, and ring 3 is set to level 3.
- When the slider is set to 4, ring 1 will be set to level 1, ring 2 will be set to level 2, ring 3 will be set to level 3, and ring 4 will be set to level 4.
- When the slider is set to level 5, ring 1 will be set to level 1, ring 2 will be set to level 2, ring 3 will be set to level 3, ring 4 will be set to level 4, and ring 5 will be set to level 5.
- When the slider is set to level 6, ring 1 will be set to level 1, ring 2 will be set to level 2, ring 3 will be set to level 3, ring 4 will be set to level 4, ring 5 will be set to level 5, and the sweeps will be set to level 5 and vertical stationary.

The candelabra sliders control 6 spouts of water, 3 on either side of the of the ring formations. These spouts of water cross in front of the ring formation creating a candelabra shape.

The front curtain, back curtain, peacock, bazooka and spout sliders are all individual sliders that do not affect the previous groups A or B. They are special function sliders that control different special effects for the fountain.

The front curtain is a wall of water that rises in front of everything in the fountain. The slider has values from 0 to 5. When the slider is at 0 the front curtain is off and when the slider is at 5 the front curtain is at max height. The values in the middle are intermediates from the bottom to top.

The back curtain is a wall of water that rises in back of everything in the fountain. The slider has values from 0 to 5. When the slider is at 0 the back curtain is off and when the slider is at 5 the back curtain is at max height. The values in the middle are intermediates from the bottom to top.

The peacock is a water formation that rises from the back of the water features. This water feature is several large lets of water that radiate out from a central point in the fountain. The formation fans out to create the look of a peacock's feathers when fully extended. The slider has values from 0 to 5. When the slider is at 0 the peacock is off. When the slider is at 5 the peacock is at max height. The values in the middle are intermediates from the bottom to top.

The bazooka is a water feature that is 2 very large cannons of water. Each cannon sits on either side and shoots towards the middle of the water fountain feature. The slider has values from 0 to 5. When the slider is at 0 the bazooka is off. When the slider is at 5 the bazooka is at max height and intersects itself in the middle of the water fountain. The values in the middle are intermediates from the bottom to top. The Bazooka's color is derived from the modules 1-3 and 5-7.

The spout, also known as the voice, is a very large water cannon that sits in the middle of the water feature. This cannon will shoot extremely high in a single jet of water. The slider has values from 0 to 5 where 0 is off and 5 are the max height. The values in the middle are intermediates from bottom to top.

Delete From the Light or Water Timeline

Deleting from the water or light timeline will create the effect that there was nothing there to begin with. The delete command within the choreography software will take all of the commands in the time square that is selected and clear it.

To delete commands within the water timeline, first select the time square to be deleted. Once the slider has advanced to the correct time click the "Delete" button. This will clear all commands in that instance of time and not send any commands to the fountain.

To delete light commands in the light timeline, first click on the "Select" button. Once the "Select" button has been selected, highlight the area that is to be deleted. Once the area has been selected click the "Delete" button. (See step-by-step instructions on page 32 and 33)

Add and Delete Beat Marks

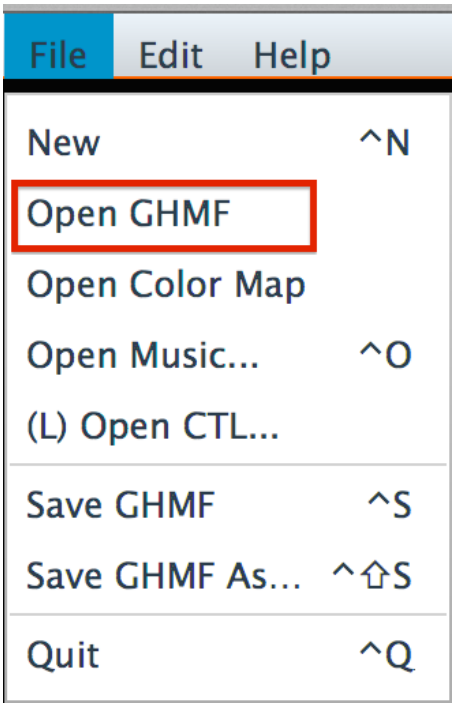
Beat marks are used for the choreographer to mark an area in the song to return to while the song is playing. This can be used to mark areas the choreographer would want to revisit for making the show.

To add a beat mark, first play the song. Once the song is playing click on the "Beat Mark Timeline". Once the beat mark timeline has focus, press the space bar to add a beat mark to the show. The beat marks will show up as black half squares in the beat mark timeline.

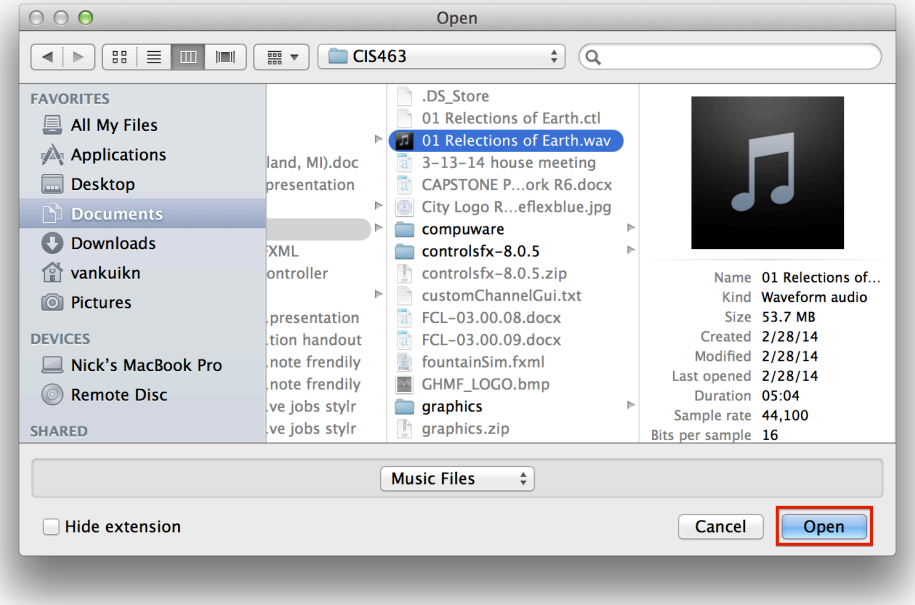
To delete a beat mark, click on the beat mark. Once the beat mark has been clicked on the beat mark will be deleted. (See step-by-step instructions on page 34 and 35)

Load a GHMF File Steps

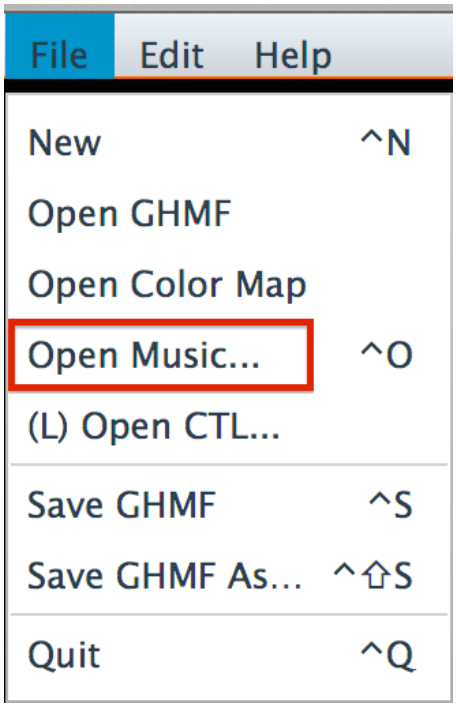
Step 1: Open the File menu and select Open GHMF



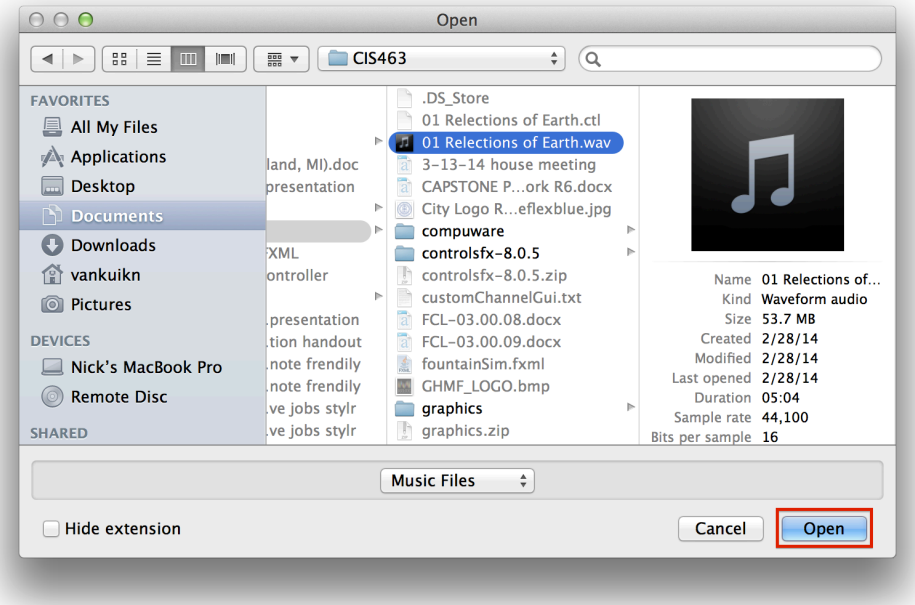
Step 2: Navigate to where the Map file is saved and click Open



Load a Song Steps



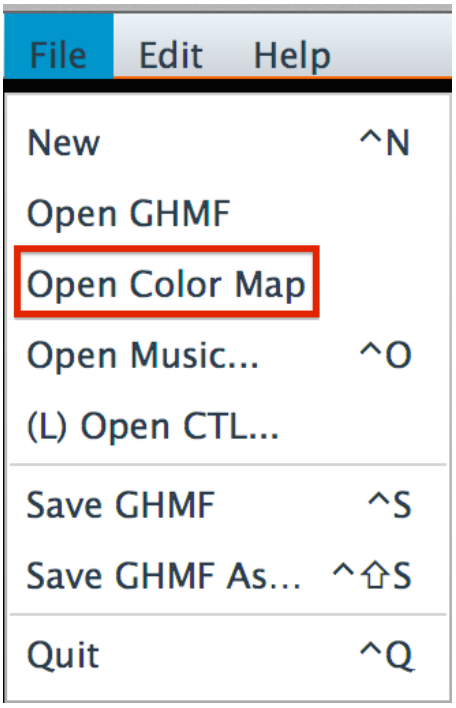
Step 1: Open the File menu and select Open Music...



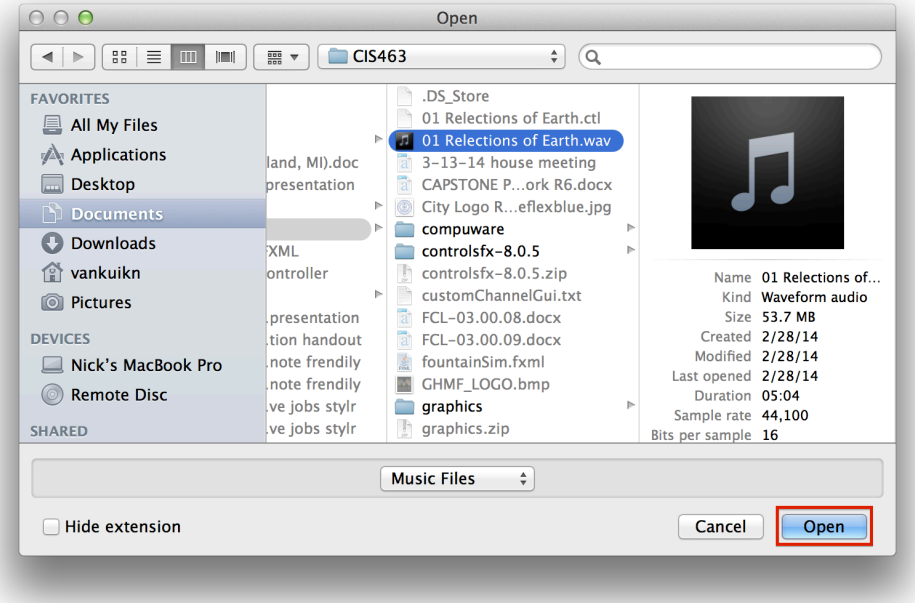
Step 2: Navigate to the song and click Open

Load a Map File Steps

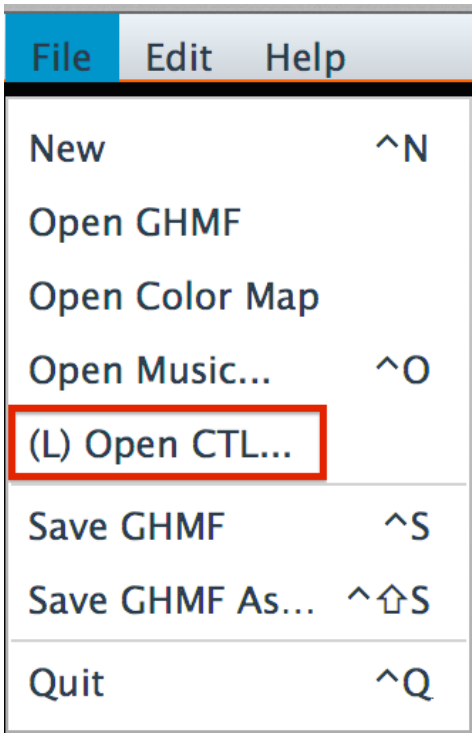
Step 1: Open the File menu and select Open Color Map



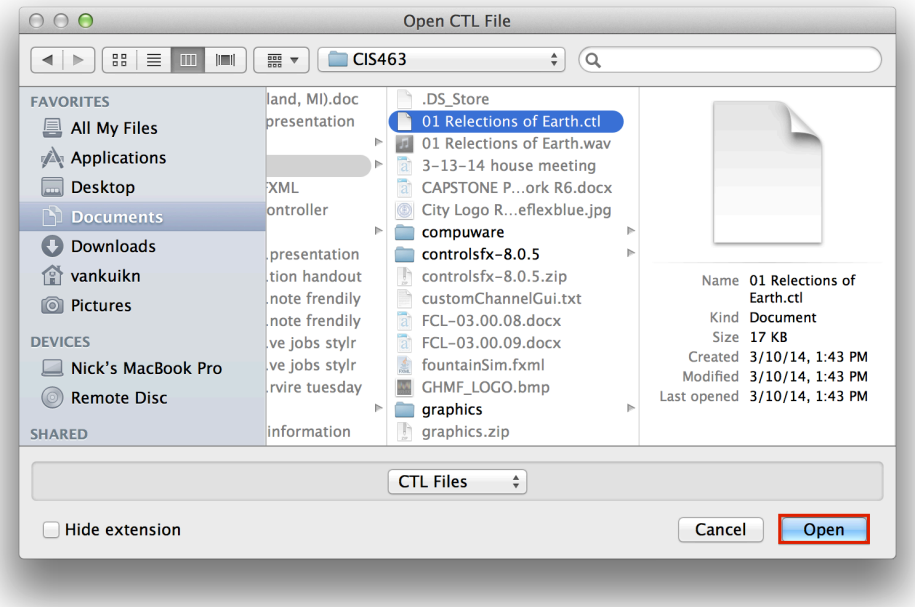
Step 2: Navigate to where the Map file is saved and click Open



Load a CTL File Steps



Step 1: Open the File menu and select Open CTL…

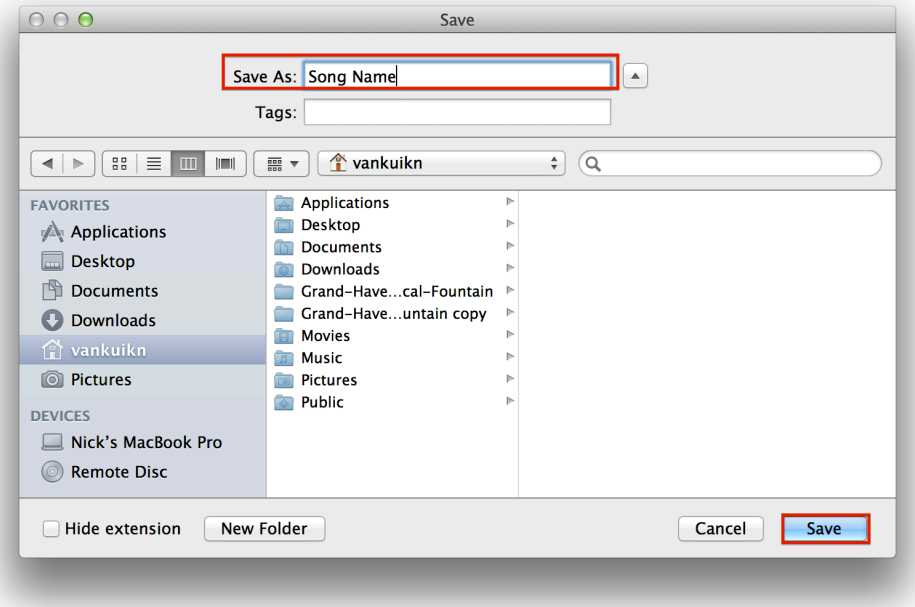


Step 2: Navigate to your CTL file and click Open

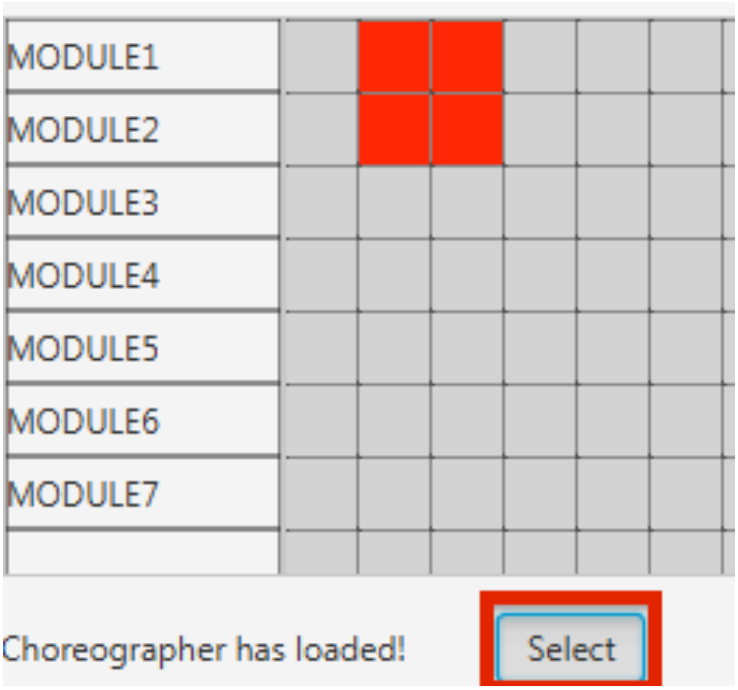
Save a Show Steps

Step 1: Open the File menu and select Save GHMF

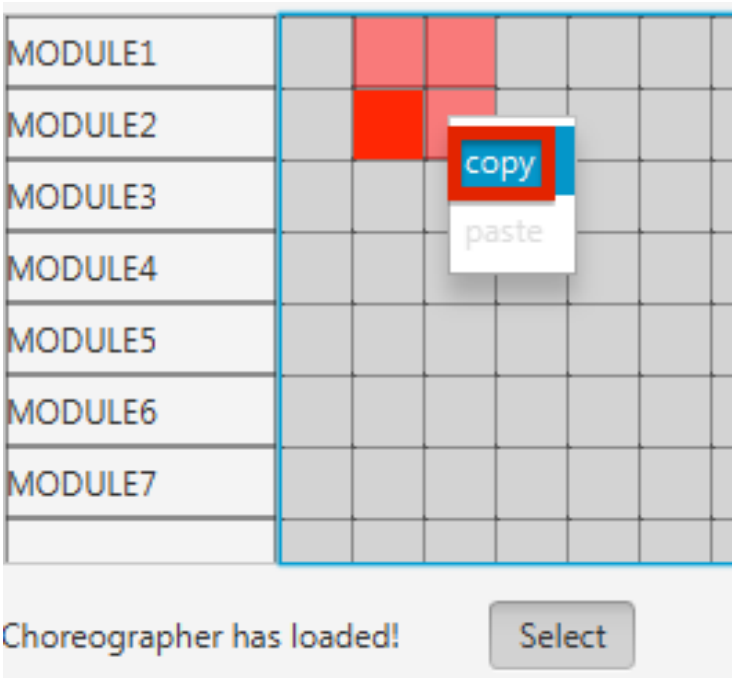
Step 2: Select where you want to save the show to and name the show then click Save



Copy Light or Water Timeline Command Steps



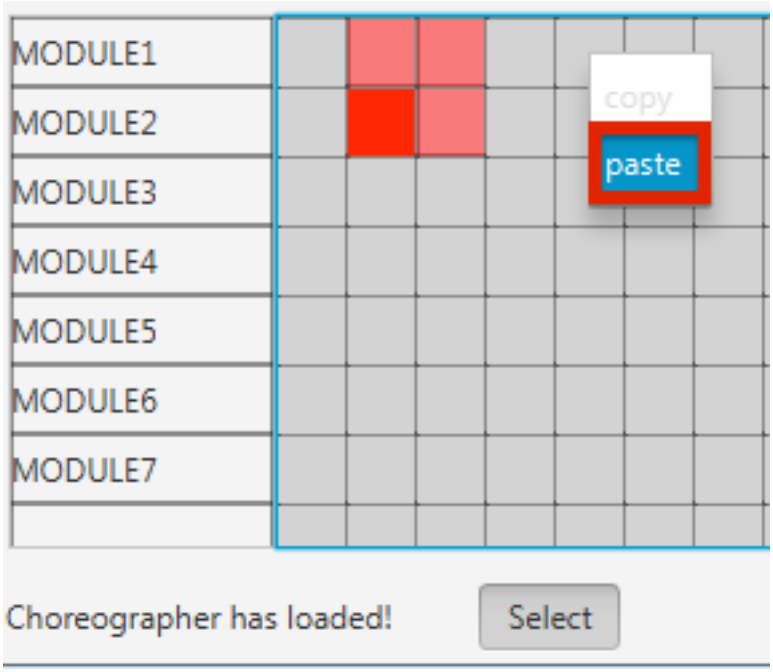
Step 1: Click on the Select button



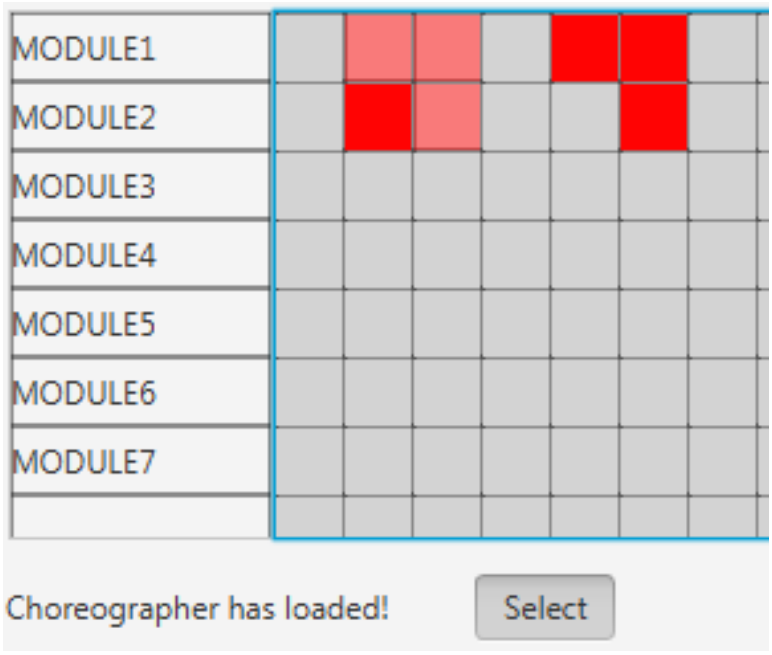
Step 2: Click and drag to select the entire area you wish to copy then right click the selection and click copy.

Paste Water or Light Timeline Commands Steps

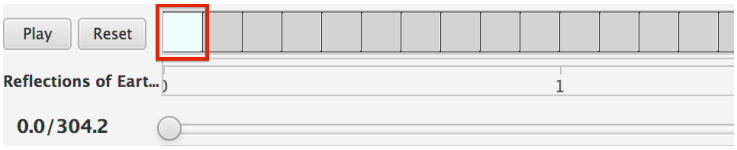
Step 1: Right click on the square you want to have the copied section start and click paste



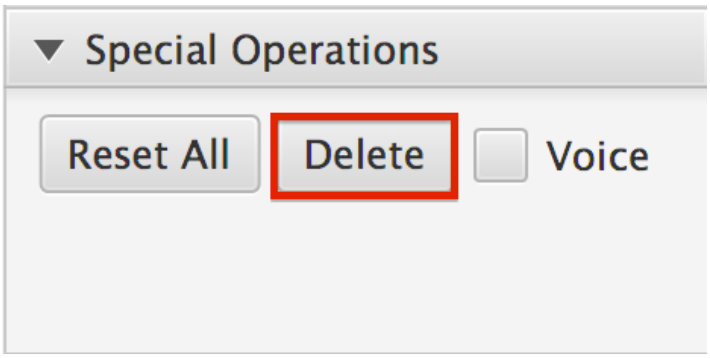
Step 2: When the paste is completed, it will draw from where the user right clicked



Delete From Water Timeline Steps



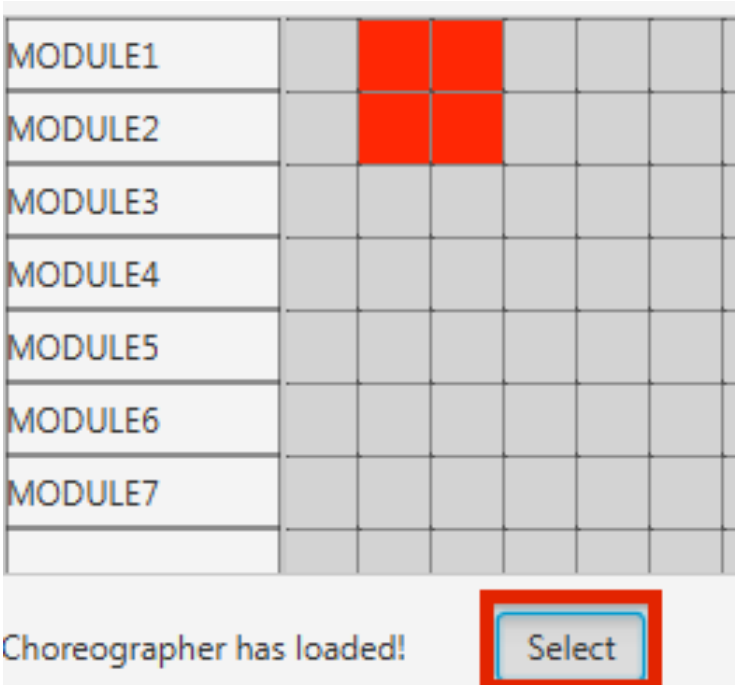
Step 1: Click on the instance in time to delete in the Water Timeline



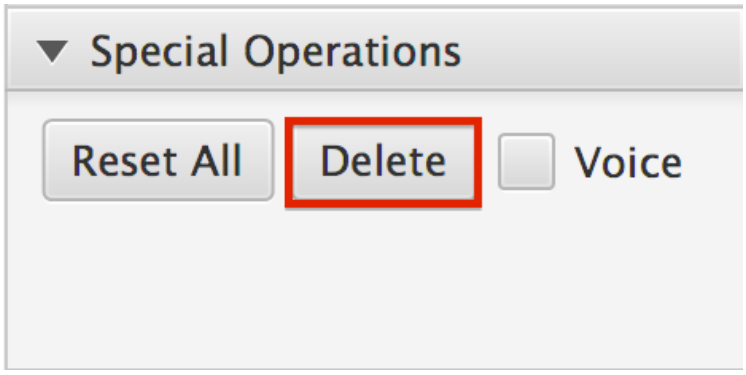
Step 2: Click the Delete button in the special ops pane

Delete From Light Timeline Steps

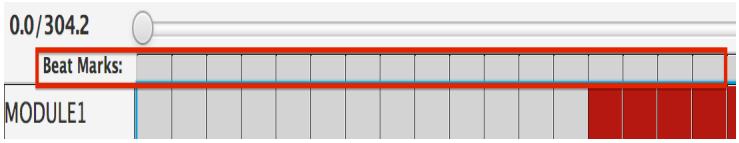
Step 1: Click on the Select button and select the area to delete



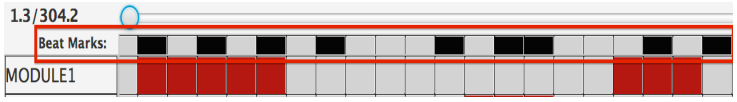
Step 2: Click the Delete button in the special ops pane



Add Beat Marks Steps



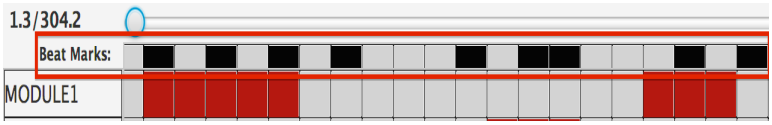
Step 1: While the song is playing click on the Beat Marks Timeline



Step 2: When a time to mark comes up press the Space button on the keyboard

Delete Beat Marks Steps

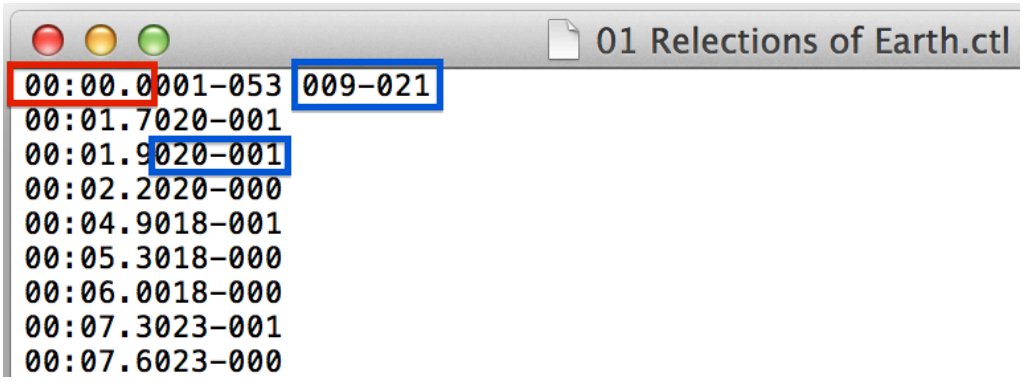
Step 1: Select the Beat Marks Timeline



Step 2: Click on the Beat Mark to delete

Appendix 1: How to Read a CTL file

The CTL file is a special file the fountain uses to play the show. This file is saved as a special .ctl file and is able to be viewed and edited by any text editor program. For this example Mac's standard text editor used.



The file is written with a specified format. The first 5 numbers are for the point in the song at which the commands will be issued. This is shown here in red. The next numbers are the data that is being sent to the fountain. This is shown in blue. This 6-digit number represents the address of the water module and the data being sent to the module.

In this example 00:00.0 would be the beginning of the song, 001-053 would be the 001 module and sending the command "053" to it and 009-021 would be the 009 module and sending the command "021".

In Appendix 6 is the entire list of commands and modules.

Appendix 2: How to Read and edit a FCW_Def File

The FCW_Def file is a text file that is used by the choreography software. This file is shipped with the software in a stock form. If the user wants to add a new channel, first define the name for the channel and define the channel. Then the user must add the channel to an existing table or create a new table. If a new table is created, the software might not be able to utilize this new table.

Once the channel has been added to the FCW_Def file the user can then add the channel utilizing the add channel feature (to be added at a future date). The channel will then be added to the selectable features in the software.

The file is split up into the water addresses, light addresses, functions, tables, table A, table B, table C, table D, table E, table F, table G, table H, table I, table J, table K, table L, table M, table N.

Appendix 3: How to Fix FCW_DEF.txt File

To fix the FCW_DEF file the user must revert the file to the original form. In Appendix 7 is the original form of the file. In the case of a corruption of this file the software will not function normally.

Appendix 4: How to Read a Lag Timetable

The Lag Time Table is used for syncing the show from the fountain to the audience. The timetable is contained in a file called LagTimeDef.txt. This file is a text file that can be opened by any text editor. There are 2 main sections in the file, the audio lag and the water feature lag times.

Audio lag is utilized for the speed of sound versus the speed of light. The sound will take longer than the light will take to reach the audience, so to make sure the show is in sync with audio the lag timetable delays the actions of the show to allow the audio to reach the audience.

The water feature lag is used for the length of time the water features take to get to the specified heights. The water fountains take a small amount of time to pump up to full capacity. If a ring feature is set to be at level 5, the lag time on this action would be a set number of tenths of a second and the show would have the action set off that set number of tenths of a second early so the water reaches the specified height at the point in the song the user has defined.

The user can edit the lag timetable via editing the text file. The text file shows the times as 0.48 indicating nearly 5/10 second. If the user changed this to 0.6 the delay would be set at 6/10 second and the feature edited would be queued 6/10 second earlier than the user defined in the software.

The format for the text file is <name of feature><space>=<space><time>

The time should be input with a leading zero such as 0.5 or 0.01.

The original lag timetable is located in Appendix 5.

Appendix 5: Original Lag Time Table

AUDIODELAY = 0.48
BAZOOKA = 0.3
BKCURT = 0.1
BKFTCURT = 0.1
CANDELABRA = 0.1
FTCURT = 0.1
MULTI = 0.1
PEACOCK = 0.1
RING1 = 0.1
RING2 = 0.1
RING3 = 0.1
RING4 = 0.1
RING5 = 0.1
SPOUT = 0.1
SWEEPA = 0.1
SWEEPB = 0.1
MULTI = 0.5

Appendix 6: Commands and Modules

LANGUAGE COMMAND STRUCTURE

The Grand Haven Musical Fountain (GHMF) is "driven" or made to perform by numeric command data transmitted via an Ethernet connection between PLC and computer. In the case of the Grand Haven Musical Fountain the data is custom and it has evolved into a command language with each command containing an "address" to identify a part of the fountain and "data" for action to be initiated. Each command in this fountain command language is called a Fountain Command Word or FCW. The commands are described in detail below.

Command lines begin with a time signature followed by one to ten commands separated by a space. The time signatures are coordinated with the music clock. This system supports time to an accuracy of 0.1 second. During the process of transcription, this time is modified in order to coordinate precisely with the view of the audience some 400 yards away from the fountain. The adjustment is to subtract enough time for the sound to travel the 400 yards.

Command lines contain one to ten individual commands in the format of AAA-DDD with a dash separating two three-digit numbers. The number AAA is the address from the ADDR column of TABLE 1. The number DDD is the data (or "function") taken from the Table specified in the "FCN" column of the address tables. The DDD number is generally (but not always) interpreted as the SUM total of the "sum" column for individual features shown in the selected rows of Tables A thru Z.

The AAA & DDD numbers are as seen in computer listings using any convenient text editor. At the fountain PLC enclosure panel, the numbers are shown or entered on the PanelView display. Note that the original A/B PLC numbers are base 16 (HEX or binary coded decimal-BCD) while this and other documents along with the computers used to program GHMF are base10 (decimal). Due to the number base duplicity and the difficulty of conversion between number bases without the aid of a computer, the HEX/BCD base numbers are listed in the "A/B" column of the tables. Both decimal and HEX/BCD number codes are available for display or entry on the PanelView operator interface at the fountain. This allows the operator to use whichever number system he is more familiar with and continues to support the legacy (HEX/BCD) codes.

ADDRESS

Table 1 - Addresses for physical devices – Legacy FCW (2013)

ADDR	*FC*	*Description of fountain action location*	*BCD*
001	A	W1 - Module Outside Ring Water with 10 foot diameter	01
002	A	W2 - Module Second ring Water with 7 foot diameter	02
003	A	W3 - Module Third ring Water with 4 foot diameter	03
004	A	W4 - Module Inner ring Water with 2 foot diameter	04
005	A	W5 - Module Center water – Single Spout	05
006	A	W6 - Sweep water on left and right of module	06
007	A	W7 - Tall water fountain center (B=VOICE) and ends (A=BAZOOKA)	07
008	A	W8 - Candelabra water in front of module	08
009	B	W9 - Front (A) /Back (B) Curtain Water & Peacock (Back+ Bypass)	09
016	E	Selected Lights from the table	10
017	C	Module #1 Lights (left hand side as viewed from river)	-
018	C	Module #2 Lights	-
019	C	Module #3 Lights	-
020	C	Module #4 Lights	-
021	C	Module #5 Lights	-
022	C	Module #6 Lights	-
023	C	Module #7 Lights (right hand side as viewed from river)	-
024	C	Back Curtain Lights (Green & Yellow only)	-
025	C	Peacock Light Group A	-
026/041	C	Peacock Light Group B [041 = Legacy for Playback Only]	-
027	C	Peacock Light Group A + B	-
033	D1	Sweep motion in A mode – Left and Right Synchronized	21
034	D1	Sweep motion in B mode – Left and Right Opposed	22
048	A	Water Modules W1-W6 & Wedding Cake formation	30
049	C	Module A lights (ODD 1, 3, 5, 7, modules)	-
050	C	Module B lights (EVEN 2. 4. 6, modules)	-
051/052	C	Module A and B lights [052 = Legacy for Playback Only]	-
053	C	Legacy reserved – [ALL LIGHTS}	-
054	F	Automatic cataloged formations [Voice water & light]	36
069	H	Repeat JUMP water level (Pulse) Sweep Water @ 0.5 sec.	45
080	I	Interchange A and B module formations of water and light	50
085	G	Shift or Rotate Module 1 thru 7 lights	-
086	Tim	Set shift timer interval – in 0.01 sec intervals [025-255]	-
097	Z	Activate programmed functions for testing (Maintenance)	61
099	0	TURN OFF everything and reset to idle condition – FCN = 0	63

Table 2 - Addresses for physical devices – new FCW (2014)

035	J	Sweep to Limit – Both A/Left & B/Right Sweeps	23
036	J	Sweep to Limit – A/Left Sweep	24
037	J	Sweep to Limit – B/Right Sweep	25
038	D2	Sweep Speed A/Left	26
039	D2	Sweep Speed B/Right	27
040	D3	Sweep Mode – Independent, Together or Opposed	28
100	K	ALL A LED Modules	-
101	L	ALL A LED Modules – FADE UP	-
102	L	ALL A LED Modules– FADE DOWN	-
103	M	ALL A LED Modules - STROBE	-
105	K	ALL B LED Modules	-
106	L	ALL B LED Modules – FADE UP	-
107	L	ALL B LED Modules – FADE DOWN	-
108	M	ALL B LED Modules - STROBE	-
109	K	ALL A & B LED Modules	-
110	K	MODULE 1 ALL LEDs	-
111	L	MODULE 1 ALL LEDs – FADE UP	-
112	L	MODULE 1 ALL LEDs – FADE DOWN	-
113	M	MODULE 1 ALL LEDs - STROBE	-
115	K	MODULE 2 ALL LEDs	-
116	L	MODULE 2 ALL LEDs – FADE UP	-
117	L	MODULE 2 ALL LEDs – FADE DOWN	-
118	M	MODULE 2 ALL LEDs - STROBE	-
120	K	MODULE 3 ALL LEDs	-
121	L	MODULE 3 ALL LEDs – FADE UP	-
122	L	MODULE 3 ALL LEDs – FADE DOWN	-
123	M	MODULE 3 ALL LEDs - STROBE	-
125	K	MODULE 4 ALL LEDs	-
126	L	MODULE 4 ALL LEDs – FADE UP	-
127	L	MODULE 4 ALL LEDs – FADE DOWN	-
128	M	MODULE 4 ALL LEDs - STROBE	-
130	K	MODULE 5 ALL LEDs	-
131	L	MODULE 5 ALL LEDs – FADE UP	-
132	L	MODULE 5 ALL LEDs – FADE DOWN	-
133	M	MODULE 5 ALL LEDs - STROBE	-
135	K	MODULE 6 ALL LEDs	-
136	L	MODULE 6 ALL LEDs – FADE UP	-
137	L	MODULE 6 ALL LEDs – FADE DOWN	-
138	M	MODULE 6 ALL LEDs - STROBE	-

140	K	MODULE 7 ALL LEDs	-
141	L	MODULE 7 ALL LEDs – FADE UP	-
142	L	MODULE 7 ALL LEDs – FADE DOWN	-
143	M	MODULE 7 ALL LEDs - STROBE	-
160	K	FRONT LED ALL Left Modules	-
16x	K	FRONT LED Left Modules where x = 1-7, L1,L6,L11,L16,L21,L26,L31	-
170	K	FRONT LED ALL Right Modules	-
17x	K	FRONT LED Right Modules where x = 1-7, L2,L7,L12,L17,L22,L27,L32	-
180	K	FRONT/BACK LED ALL *Mirrors – x=1-7	-
18x	K	FRONT/BACK LED *Mirror – x = 1-7, L3,L8,L13,L18,L23,L28,L33	-
		*Mirror –spot for tall water located in back of Modules except	
190	K	Spout / Voice Lights ALL	-
191	L	Spout / Voice Lights ALL – FADE UP	-
192	L	Spout / Voice Lights ALL – FADE DOWN	-
193	M	Spout / Voice Lights ALL - STROBE	-
194	K	Spout / Voice Light 1 – L36	-
195	K	Spout / Voice Light 2 - Reserved	-
200	K	FRONT CURTAIN ALL LED Modules	-
201	L	FRONT CURTAIN ALL LED Modules – FADE UP	-
202	L	FRONT CURTAIN ALL LED Modules – FADE DOWN	-
203	M	FRONT CURTAIN ALL LED Modules - STROBE	-
205	K	BACK CURTAIN ALL LED Modules	-
206	L	BACK CURTAIN ALL LED Modules – FADE UP	-
207	L	BACK CURTAIN ALL LED Modules – FADE DOWN	-
208	M	BACK CURTAIN ALL LED Modules - STROBE	-
210	K	BACK LED ALL Left Modules	-
21x	K	BACK LED Left Modules where x = 1-7, L4,L9,L14,L19,L24,L29,L34	-
220	K	BACK LED ALL Right Modules	-
22x	K	BACK LED Right Modules where x = 1-7, L5,L10,L15,L20,L25,L30,L35	-
230	K	PEACOCK ALL LEDs	-
231	L	PEACOCK ALL LEDs – FADE UP	-
232	L	PEACOCK ALL LEDs – FADE DOWN	-
233	M	PEACOCK ALL LEDs - STROBE	
241	K	PEACOCK LED1 – L37	-
242	K	PEACOCK LED2 – L38	-
243	K	PEACOCK LED3 – L39	-
244	K	PEACOCK LED4 – L40	-
245	K	PEACOCK LED5 - RESERVED	-
246	K	PEACOCK LED6 - RESERVED	-
247	K	PEACOCK LED7 - RESERVED	-
248	K	PEACOCK LED8 - RESERVED	-

250	K	ALL LED LIGHTS	-
251	L	ALL LED LIGHTS – FADE UP	
252	L	ALL LED LIGHTS – FADE DOWN	
253	M	ALL LED LIGHTS - STROBE	

DATA (or FUNCTION)

Table A – Module water level

Sum	***Selected water height***	***A/B***
0	Water level off and bypass valve closed	0
1-5	Water level setting – A height from 1 to 5	1-5
6	*Wedding Cake – (48d only)	6
16	Module A water valves (odd numbered) only	10
32	Module B water valves (even numbered) only	20
64	Connect A to B thru bypass valve	40

*Wedding cake water levels – Ring 1 = 1, Ring 2 = 2, Ring 3 = 3, Ring 4 = 4, Ring 5 = 5, Sweep = 5

Table B – Curtains and Peacock water level

Sum	***Selected water height (non-module)***	***A/B***
0	Water level off and Peacock toggle valve closed	0
1-5	Water level setting – Select a height from 1 to 5	1-5
16	Front Curtain water valves only	10
32	Back Curtain water valves only	20
64	Peacock ON / Back Curtain OFF - toggle valve	40

Table C – Light colors

Sum	***Selected colors for Module Lights***	***A/B***
0	All OFF [all ADDR]	-
1	Turn on RED [all ADDR except 024d]	-
2	Turn on BLUE [all ADDR except 024d]	-
4	Turn on AMBER [all ADDR except 024d]	-
8	Turn on WHITE [all ADDR except 024d, 25-27d + 41d]	-
16	Turn on GREEN Back Curtain [only ADDR 024d]	-
32	Turn on YELLOW Back Curtain [only ADDR 024d]	-

Tables D1 – D2 – D3

Table D1 – Sweep speed, Legacy command pre-2014

Sum	*Selected motion for sweep mode*	*A/B*
00	All STOP & RETURN TO CENTER	00
01	SHORT Sweep motion	01
02	LONG Sweep motion	02
08	SWEEP PAUSE/RESUME	08
16	LARGO – as slow as it goes (hardly moves)	10
32	ADAGIO -- SLOW speed from original *	20
48	ANDANTE	30
64	MODERATO -- MEDIUM speed from original *	40
80	ALLEGRETO	50
96	ALLEGRO -- FAST speed from original *	60
102	PRESTO – as fast as it goes (breathing heavy)	70

NOTE: speed entries marked * are grandfathered from older control programs. Note2: [1 - 8] and [16 -102] are exclusive – the selected numbers are then totaled.

Table D2 – Sweep speed, new command 2014

Data	*Selected motion for sweep mode*	*A/B*
00	All STOP & RETURN TO CENTER	00
08	SWEEP PAUSE/RESUME	08
16	LARGO – as slow as it goes (hardly moves)	10
32	ADAGIO -- SLOW speed from original *	20
48	ANDANTE	30
64	MODERATO -- MEDIUM speed from original *	40
80	ALLEGRETO	50
96	ALLEGRO -- FAST speed from original *	60
102	PRESTO – as fast as it goes (breathing heavy)	70

NOTE: speed entries marked * are grandfathered from older control programs. These selections are mutually exclusive.

Table D3 – Sweep Mode – new command 2014

Data	*Selected Lights on/off (address extension)*	*A/B*
0	Sweep Independent – NOT SYNCHRONIZED	0
1	Sweeps Left & Right Move TOGETHER	1
2	Sweeps Left & Right Move OPPOSED	2

NOTE: These selections are mutually exclusive not additive.

Table E – Selected special lights

Sum	*Selected Lights on/off (address extension)*	*A/B*
0	All OFF	0
2	Top of hill – Cross / Star / Anchor - Highlight	2
4	White Beacons on end of fountain apron	4
8	(Superseded White module lights: see 053-08)	8

Table F – Cataloged configurations

Sum	*Selected Creations or groups*	*A/B*
0	All OFF	0
1	Voice of the Fountain water and lights ON	1

Table G – Module light shifting

Sum	*Selected Module light shifting actions*	*A/B*
00	STOP all shifting & reset	-
01	Motion to the RIGHT (toward higher # Modules)	-
02	Motion to the LEFT (toward lower # Modules)	-
16	Shift w/o end-carry (end module color is lost after shift)	-
32	Shift light with end-carry (loop or rotate or ring)	-
64	REPEAT shifting at timed interval	-

Table H – Module water JUMP data

Sum	*AUTO-JUMP type selection for water*	*A/B*
0	STOP JUMPING and return to preset level	00
6	ADDRESS the Sweep Water formation	06
16	JUMP “A” module water level	10
32	JUMP “B” module water level	20
64	JUMP “0” phase or “1” phase of cycle timers	40

NOTE - Pulsate Only works with Sweeps. i.e. Add “6” to each selection.

Table I – Module water & light exchange pattern

Sum	*EXCHANGE of configuration specified in ADDR*	*A/B*
00	STOP Motion	00
01	Effect the WATER settings	01
02	Effect the LIGHT settings	02
16	Place “A” configurations into “B”	10
32	Place “B” configurations into “A”	20
64	REPEAT exchange at timed interval	40

Note- combine bits above to EXCHANGE A & B for Water and/or Lights

H.Table J – Sweep to Limit or Between Limits

ADDRESS	DESCRIPTION	DATA	DESCRIPTION
35	SWEEP SPECIAL	0	HOLD @ RIGHT OVERTRAVEL LIMIT
BOTH A & B SWEEPS ARE AFFECTED Sweep from Right Limit to Left Limit If Right = Left Limit, Hold at Limit NOTE THESE WATER COMMANDS ARE OPPOSITE OF SWEEP CYLINDER MOTIONS		1	RIGHT O.T. TO RIGHT LONG
		2	RIGHT O.T. TO RIGHT SHORT
		3	RIGHT O.T. TO CENTER
		4	RIGHT O.T. TO LEFT SHORT
		5	RIGHT O.T. TO LEFT LONG
		6	RIGHT O.T. TO LEFT O.T.
		17	HOLD AT RIGHT LONG
		18	RIGHT LONG TO RIGHT SHORT
		19	RIGHT LONG TO CENTER
		20	RIGHT LONG TO LEFT SHORT
		21	RIGHT LONG TO LEFT LONG
		22	RIGHT LONG TO LEFT O.T.
		34	HOLD AT RIGHT SHORT
		35	RIGHT SHORT TO CENTER
		36	RIGHT SHORT TO LEFT SHORT
		37	RIGHT SHORT TO LEFT LONG
		38	RIGHT SHORT TO LEFT O.T.
		51	HOLD AT CENTER
		52	CENTER TO LEFT SHORT
		53	CENTER TO LEFT LONG
		54	CENTER TO LEFT O.T.
		68	HOLD AT LEFT SHORT
		69	LEFT SHORT TO LEFT LONG
		70	LEFT SHORT TO LEFT O.T.
		85	HOLD AT LEFT LONG
		86	LEFT LONG TO LEFT O.T.
		102	HOLD AT LEFT O.T.

Table K – LED Color Select

Select	*Color Palette #*	*A/B*
00	LED OFF	-
1-32	Color Palette 1-32	-

Table L – FADE

Select	*Time interval in .01 secs*	*A/B*
xxx	Interval – .01 secs 10-999	-

Table M – STROBE

Select	*Time interval – 1-255*	*A/B*
xxx	Time interval – 1-255	-

Table N – Maintenance data (not choreography use)

Select	*Selected Creations for ADDR*	*A/B*
N/A	All maintenance functions OFF	00
N/A	Activate all lights for walk around test viewing	-
N/A	Begin valve Calibration auto cycle	20

PROGRAM EXAMPLE

Following is an excerpt from a program contained in the standard library.

```
11:30.5006-049 050-010 049-012
11:31.7009-016 049-004 050-002 049-006 050-010
11:33.5099-000 099-000
11:34.5054-001 054-001
11:54.0005-021 004-020 002-019 005-033 004-033 002-033
11:55.0008-020 008-033 049-004 050-001
11:56.0005-064 004-064 002-064 008-064 049-006 050-005
11:56.2054-000 054-000
11:57.0005-000 004-000 002-000 008-000 049-001 050-003
11:58.0005-064 004-064 002-064 008-064 049-006 050-005
11:59.0005-000 004-000 002-000 008-000 049-001 050-003
12:00.0005-064 004-064 002-064 008-064 049-006 050-005
12:03.0006-051 052-008 000-002
12:06.2101-888 104-025 106-889 107-024
12:06.4122-888 123-025 125-889 128-024
12:06.6181-050 182-050 183-050 184-050 185-050 186-050 187-050 188-150
12:06.9032-001 000-003
```

It is inserted here as an exercise for the novice programmer. Use the example and the specification for a learning exercise.

Appendix 7: Stock FCW_Def File

<TODO> Get new table from code
|WaterAddresses|
RING5, 001
RING4, 002
RING3, 003
RING2, 004
RING1, 005
SWEEP, 006
SPOUT, 007
BAZOOKA, 007
CANDELABRA, 008
FTCURT, 009
BKCURT, 009
PEACOCK, 009
SWEEPA, 033
SWEEPB, 034
MULTI, 048
|EndWaterAddresses|
|LightAddresses|
LIGHTS, 016
MODULE1, 017
MODULE2, 018
MODULE3, 019
MODULE4, 020
MODULE5, 021
MODULE6, 022
MODULE7, 023
BACKCURTAIN, 024
PEACOCKA, 025
PEACOCKB, 026
PEACOCKBLEGACY, 041
PEACOCKAB, 027
MODULEA, 049
MODULEB, 050
MODULEAB, 051
MODULEABLEGACY, 052
LEGACYRESERVED, 053
FRONTALED, 100
FRONTALEDFADEUP, 101
FRONTALEDFADEDOWN, 102
FRONTALEDSTROBE, 103
FRONTBLED, 105

PEACOCKLED1, 241
PEACOCKLED2, 242
PEACOCKLED3, 243
PEACOCKLED4, 244
PEACOCKLED5, 245
PEACOCKLED6, 246
PEACOCKLED7, 247
PEACOCKLED8, 248
ALLLEDS, 250
ALLLEDFADEUP, 251
ALLLEDFADEDOWN, 252
ALLLEDSSTROBE, 253
|EndLightAddresses|
|Functions|
SWEEPLIMITAB, 035
SWEEPLIMITA, 036
SWEEPLIMITB, 037
SHIFTROTATE, 085
SETTIMER, 086
PULSE, 069
VOICE, 054
INTERCHANGEAB, 080
TEST, 097
OFF, 099
|EndFunctions|
|Tables|
TableA, 001, 002, 003, 004, 005, 006, 007, 008, 048
TableB, 009
TableC, 017, 018, 019, 020, 021, 022, 023, 024, 025, 026, 041, 027, 049, 050, 051, 052, 053
TableD, 033, 034
TableE, 016
TableF, 054
TableG, 085
TableH, 069
TableI, 080
TableJ, 035, 036, 037
TableK, 100, 105, 109, 110, 115, 120, 125, 130, 135, 140, 160, 161, 162, 163, 164, 165, 166, 167, 170, 171, 172, 173, 174, 175, 176, 177, 180, 181, 182, 183, 184, 185, 186, 187, 190, 194, 195, 200, 205, 210, 211, 212, 213, 214, 215, 216, 217, 220, 221, 222, 223, 224, 225, 226, 227, 230, 241, 242, 243, 244, 245, 246, 247, 248, 250
TableL, 101, 102, 106, 107, 111, 112, 116, 117, 121, 122, 126, 127, 131, 132, 136, 137, 141, 142, 191, 192, 201, 202, 206, 207, 231, 232, 251, 252
TableM, 103, 108, 113, 118, 123, 128, 133, 138, 143, 193, 203, 208, 233, 253

TableO, 099
TableZ, 097
TableTime, 086
|EndTables|
|Commands|
| TableA |
0, 0
1, 1
2, 2
3, 3
4, 4
5, 5
6, 6
SPOUT, 32
BAZOOKA, 16
MODULEA, 16
MODULEB, 32
CONNECTAB, 64
|EndTable|
| TableB |
0, 0
1, 1
2, 2
3, 3
4, 4
5, 5
FTCURT, 16
BKCURT, 32
PEACOCK, 64
|EndTable|
| TableC |
OFF, 0
RED, 1
BLUE, 2
AMBER, 4
WHITE, 8
GREEN, 16
YELLOW, 32
|EndTable|
| TableD |
OFFRESET, 00
SHORT, 01
LONG, 02
PLAYPAUSE, 08
LARGO, 16

ADAGIO, 32
ANDANTE, 48
MODERATO, 64
ALLEGRETO, 80
ALLEGRO, 96
PRESTO, 102
|EndTable|
| TableE |
OFF, 0
TOP, 2
BEACONS, 4
WHITELEGACY, 8
|EndTable|
| TableF |
ON, 1
OFF, 0
|EndTable|
| TableG |
STOP, 00
RIGHT, 01
LEFT, 02
SHIFT, 16
ROTATE, 32
INTERVAL, 64
|EndTable|
| TableH |
STOP, 0
ADDRSWEEP, 6
JUMPA, 16
JUMPB, 32
JUMP0OR1, 64
|EndTable|
| TableI |
STOP, 00
EFFECTWATERAB, 01
EFFECTLIGHTAB, 02
PLACEAB, 16
PLACEBA, 32
REPEATINTERVAL, 64
|EndTable|
| TableJ |
HOLDRIGHTOT, 0
RIGHTOTRIGHTLONG, 1
RIGHTOTRIGHTSHORT, 2
RIGHTOTCENTER, 3

RIGHTOTLEFTSHORT, 4
RIGHTOTLEFTLONG, 5
RIGHTOTLEFTOT, 6
HOLDRIGHTLONG, 17
RIGHTLONGRIGHTSHORT, 18
RIGHTLONGCENTER, 19
RIGHTLONGLEFTSHORT, 20
RIGHTLONGLEFTLONG, 21
RIGHTLONGLEFTOT, 22
HOLDRIGHTSHORT, 34
RIGHTSHORTCENTER, 35
RIGHTSHORTLEFTSHORT, 36
RIGHTSHORTLEFTLONG, 37
RIGHTSHORTLEFTOT, 38
HOLDCENTER, 51
CENTERLEFTSHORT, 52
CENTERLEFTLONG, 53
CENTERLEFTOT, 54
HOLDLEFTSHORT, 68
LEFTSHORTLEFTLONG, 69
LEFTSHORTLEFTOT, 70
HOLDLEFTLONG, 85
LEFTLONGLEFTOT, 86
HOLDLEFTOT, 102
SWEEPSPECIAL, 35
|EndTable|
| TableK |
OFF, 00
COLORPALETTE1, 01
COLORPALETTE2, 02
COLORPALETTE3, 03
COLORPALETTE4, 04
COLORPALETTE5, 05
COLORPALETTE6, 06
COLORPALETTE7, 07
COLORPALETTE8, 08
COLORPALETTE9, 09
COLORPALETTE10, 10
COLORPALETTE11, 11
COLORPALETTE12, 12
COLORPALETTE13, 13
COLORPALETTE14, 14
COLORPALETTE15, 15
COLORPALETTE16, 16
COLORPALETTE17, 17

COLORPALETTE18, 18
COLORPALETTE19, 19
COLORPALETTE20, 20
COLORPALETTE21, 21
COLORPALETTE22, 22
COLORPALETTE23, 23
COLORPALETTE24, 24
COLORPALETTE25, 25
COLORPALETTE26, 26
COLORPALETTE27, 27
COLORPALETTE28, 28
COLORPALETTE29, 29
COLORPALETTE30, 30
COLORPALETTE31, 31
COLORPALETTE32, 32
|EndTable|
| TableL |
FADEINTERVAL10, 000
|EndTable|
| TableM |
STROBEINTERVAL1, 000
|EndTable|
| TableN |
ALLMAINTENANCEFUNCTIONOFF, 0
ACTIVATEALLLIGHTS, 0
BEGINVALVECALIBRATION, 20
|EndTable|
|EndCommands|

Glossary

Candelabra – Large candle stick formation.

Color Map – A color map is a DMX language that is used to represent colors that are used throughout the show. The color map is used for loading the color palette into the software and for representing the colors so the lighting software can use the commands correctly.

CTL File – The CTL file is the file that is sent to the fountain for the show. The CTL file contains all of the commands and the specific times the commands are sent to the fountain.

FCW – Fountain Control Word. The fountain control words are used to allow the fountain to know which elements to use. The FCWs have been developed separately from this software.

GHMF File – The GHMF (Grand Have Musical Fountain) file is a zipped file of all of the files used by the choreography software. This file contains the .wav file used for the song, the .ctl file used for the show, the color map file used for the colors and the .mark file used for the beat marks.

JRE – Java Runtime Environment. Utilized for crating the software and required on the user's computer to run the software. Java was selected because it allowed the software to be run on any computer.

Lag Time Table – The lag timetable is used for making sure the show is in sync with the music. The lag timetable addresses 2 main issues, the speed of light versus sound and the time the water features take to get to specified heights.

Mark File – The .mark file is a file that is used for the position of the beat marks used in the software. This files makes it possible for the software to remember where the beat marks were.

Module – Each module representation is a section in the fountain. There are water ring modules that are the different ring formation groups, light modules that control how the show will look.

Acknowledgments

April 15, 2014

Dear Terry Stevens,
Dan Vivian,
Ryan Strayhorn,
Jason Lebrasseur,
David K Lange:

On behalf of the team members of Excalibur Solutions, Grand Valley State University senior project team, we would like to thank everyone who made this project a possibility.

Given this projects great impact on the community and the city of Grand Haven, our goal was to create new software the community could use to create shows for their city's fountain. Your commitment and collaborative effort has made this capstone project a valuable learning opportunity and a chance for us to contribute to an important aspect of Grand Haven's history.

Again, thank you for your generous time, support and participation in the creation of this software. We look forward to the continued success of the Grand Haven Musical Fountain.

Sincerely,
Team Excalibur Solutions

Frank Madrid
Steven Merdzinski
Max Morell
Matthew Griffioen
Nick Van Kuiken

Index