

Spikemark 4

Reference Manual

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WELCOME TO SPIKEMARK

Welcome to Spikemark, the software designed to control entertainment automation. Spikemark is built to make moving scenery easy and intuitive. As productions grow in complexity, Spikemark offers a simple solution to bring the excitement of motorized scenery to every show. Using a Windows® PC, standard Ethernet hardware, and Stagehand controllers you can have a motion control system that is easy to set-up and expand while being incredibly economical. Whether you need to move a deck winch, turntable, roll drop, hoist, or any other effect, Spikemark allows you to support the artistic vision of your production with ease.

Spikemark includes many amazing features to help you *Make It Move!* However, one of our favorite and most powerful features is Simulator. In Simulator mode, you can write and run cues on a virtual stage without being physically connected to any machinery. You can visualize automated effects in your office, in a design meeting, or on your couch, letting you easily experiment with moving scenery.

A WORD ABOUT SAFETY

Motion control allows huge scene changes to operate smoothly in a matter of seconds. The spectacle created by motorized scenery can be stunning, but this power deserves the utmost caution.

Unlike operating a computerized lighting console or sound system, an automation system can pose a serious danger to performers and technicians. Large pieces of scenery moving at high speeds can easily injure, possibly fatally, any person that is unwittingly caught in its path. Therefore, a large responsibility is placed on you, as the automation operator, to be alert and aware at all times of the people that may be in harm's way.

THE GO BUTTON DEMANDS A HIGH LEVEL OF RESPECT

Spikemark assists the operator in maintaining safety by providing constant information regarding every motor's position and status. From within Spikemark the GO button starts motion and the STOP button brings all motion to a halt in a controlled manner. In other instances you may need to stop all motion immediately, that's where the Emergency Stop system comes in. Spikemark cannot operate machines without a functional Showstopper 3 system in the mix. While Spikemark (the software) excels at smoothly controlling motion, the E-Stop excels at halting all motion immediately. Ultimately, it is the operator's judgment, ability, and responsibility to see any potential hazards that will keep people and scenery safe and allow the show to go on.

SYSTEM REQUIREMENTS

Spikemark can be used in two modes: Simulator or Live. Simulator will enable you to set up a show, program cues, and run cues on the 3D Stage Model. In Live mode, you can connect Spikemark to real machinery and run cues that make actual scenery move while still viewing the 3D Stage Model.

Spikemark 4 is 100% free. You read that correctly, it is **free**. Go ahead and download a copy for your show computer and another copy for your office computer and another one for your laptop. You can set up your show file on one computer and transfer the file to another computer without issue.

Spikemark is a lightweight program - for most folks there's no reason to buy or build a heavyweight PC to run it. That said, the more complex the show file (a large number of axes or many groups), the more horsepower your PC will need.

To effectively use Spikemark in Simulator Mode you will need:

- A Windows® compatible PC
 - 3 GHz or faster. Core i5 recommended - but faster is always better!
- A dedicated graphics processor (recommended but not required)
- A monitor (two can be helpful)
- Windows® 10
- Microsoft's .Net 4.6 framework
- 8GB RAM & 25MB of free storage space
 - 16GB of RAM is recommended

To run a show with Spikemark in Live mode you will also need:

- 10/100 Ethernet interface
 - Built in Ethernet
 - A network interface card
 - A USB to Ethernet adapter
- An Ethernet switch (Any name brand switch will work)
 - We recommend an unmanaged switch because they do not require any additional configuration at the switch
- Ethernet cables (1 for every device on the network)
- One or more Stagehand motor controllers
 - These can be paired with electric, pneumatic, or hydraulic machines.
- A Showstopper 3 Base

- Showstopper 3 Consolette (optional but recommended)
- Spikemark Pendant (optional but very cool)

PRODUCT MANUALS

Many products made by Creative Conners, Inc will be discussed in this manual and more info regarding these products can be found at:

<https://creativeconners.com/products/>

ONLINE TUTORIALS

There is a small but increasing selection of video tutorials on the Creative Conners website and on our YouTube channel that cover all the basic uses of Spikemark as well as some great user videos.

<https://www.youtube.com/user/creativeconners/videos>

If you are looking for specific help and can't locate a video, feel free to email support@creativeconners.com or give us a call at 401-289-2942 x2 and one of our technicians will help get you moving.

SPIKEMARK INSTALLATION

Installing Spikemark is a quick and simple process. Once the installer is downloaded, (~20mb) the process should take less than 5 minutes.

INSTALLATION TYPES

Spikemark can be installed in two ways: **Standard** or with **Authentication**. Although Spikemark functions the same with either installation, there are important differences between the two.

Standard Installation	Installation with Authentication
Installed in the 'C:\Program Files (x86)\' directory	Installed in the 'C:\Users\{user}\AppData\Roaming\Spikemark\' directory
Does not support Spikemark user log in	Requires creation of local admin and user accounts
Lock down show file by entering Run Only mode	Lock down the show file with user level access. An admin is allowed to make changes to the file while a user is not.

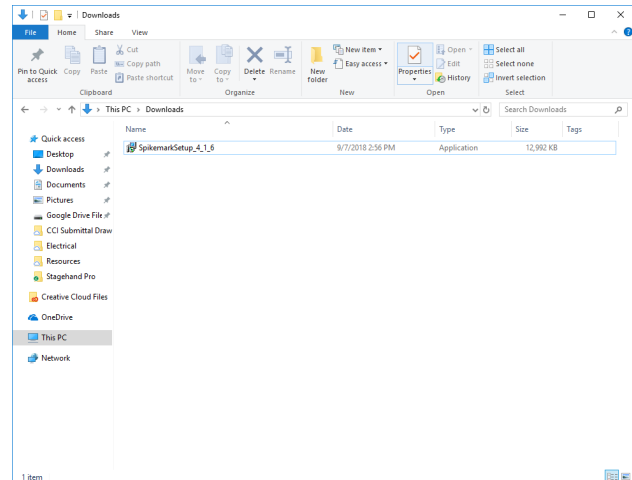
The Authentication feature is conceived as a tool for stand-alone Spikemark installations, such as museum exhibits or permanent installation. This doesn't mean one is prohibited from using the feature in other instances, though it could introduce some challenges during preview rehearsals if the operator cannot make changes to the show.

DOWNLOADING SPIKEMARK

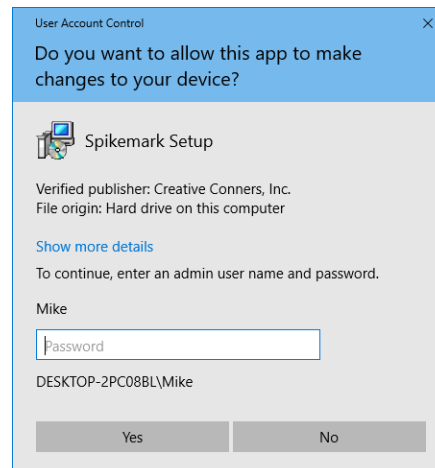
No matter the installation method, the first step is to download the most recent version of Spikemark (Version 4.4.3 in this guide). Navigate to http://cci.fyi/spikemark_install to download the most up to date Spikemark installer.

STANDARD SPIKEMARK INSTALLATION

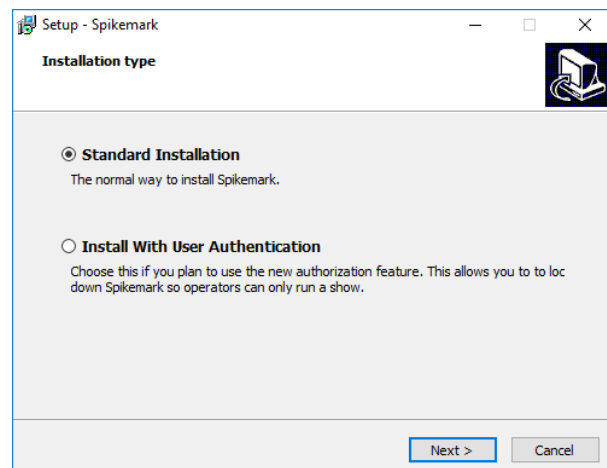
1. Locate the downloaded Spikemark Installer and double click the file.



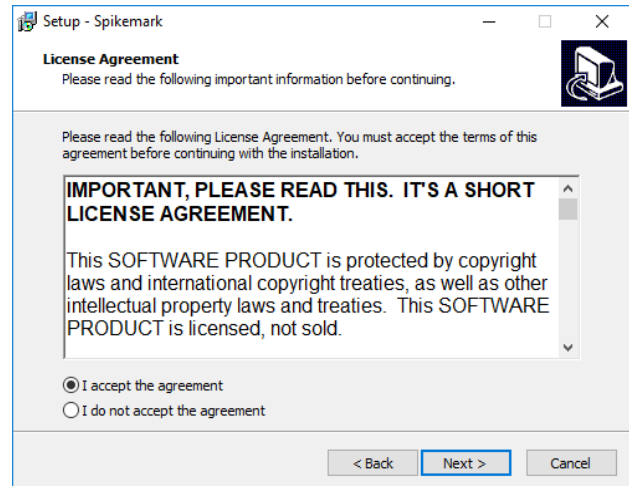
2. Click Yes to allow Spikemark Installer to be executed.



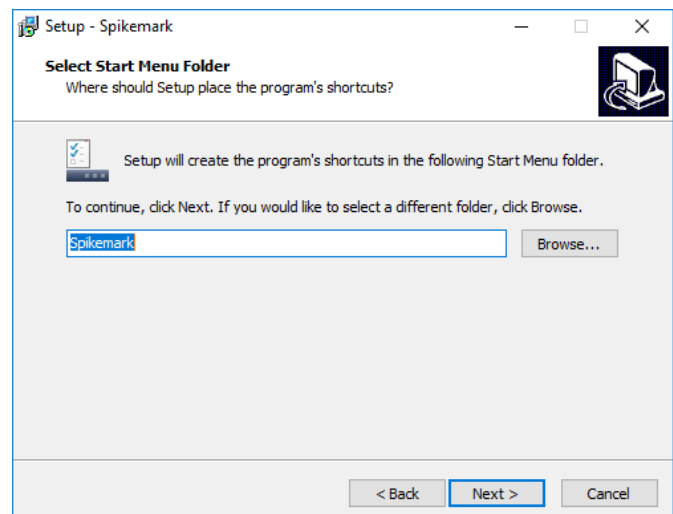
3. Confirm the correct installation type (Standard Installation here) radial button is selected and click Next >.



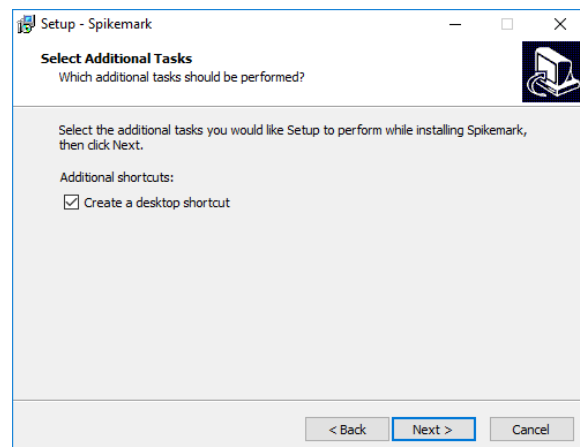
4. Read and accept the License Agreement, then press Next>.



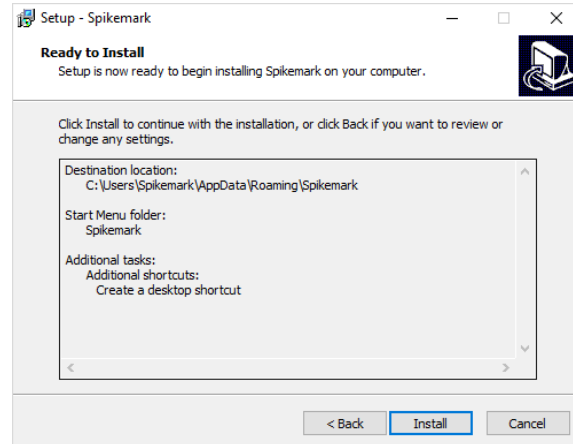
5. Click Next> to accept the default Start Menu location.



6. Click the checkbox if you would like to create a desktop shortcut, otherwise leave unchecked and click Next>.

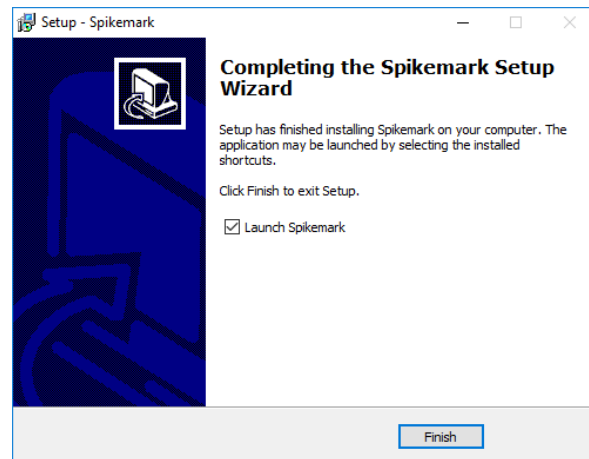


7. Confirm the installation details and click Install.



8. A status window will appear with a progress bar, an additional window may pop up and disappear as well. Once the installer is finished you will see this window:

Un-check the Launch Spikemark box if you do not want to run the program immediately, then click Finish.



9. If you choose to Launch Spikemark, the program will open with the default show open.

INSTALL LOCATION AND SUPPORT FILES - STANDARD INSTALLATION

With Standard installation, Spikemark is installed in the 'C:\Program Files (x86)\' directory. Along with the Program file, there are other support files located here - most notably the '\Spikemark Firmware' directory. This folder and location is important in order for Spikemark to know what the most current firmware is. When connected to a Stagehand and you see "unknown" under most recent firmware this probably means the firmware directory location cannot be found by Spikemark.

The Spikemark log files, which are important to troubleshooting, are located here:

'C:\Users\{user}\AppData\Roaming\Creative Conners, Inc\Spikemark\4.x.x.x'

Don't worry about remembering the directory, you can find the current log file easily from Spikemark by

clicking on 'Help-> Reveal Log File' which will open the correct folder with the current log file highlighted.

INSTALLING SPIKEMARK WITH USER AUTHORIZATION

In order for user authorization to function properly, you (or someone with admin rights) will need to create at least three local accounts:

- Admin(s) (local admin, password)
 - There can be multiple Admin level accounts
- Spikemark (local user, no password)
 - One account only
- Operator(s) (local user, password)
 - There can be multiple Operator level accounts

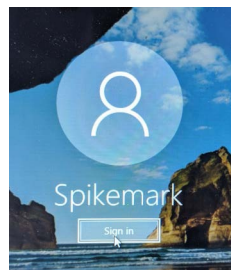
Under this user structure, any users with Admin rights will be able to log into Spikemark, enable or disable Authorization, and (most importantly) make changes to a Spikemark show file. Any user without Admin rights will only be allowed to log into Spikemark and run shows - they will not be able to enable/disable authorization or make edits to show files.

NOTE:

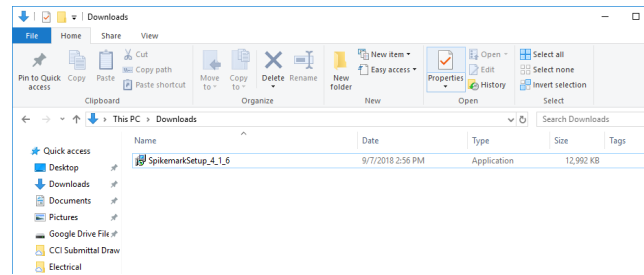
Spikemark Authorization will not work with domain controlled accounts. If the computer you use is part of a domain, Spikemark Authorization is not the path for you.

With this scenario outlined above, you can set Windows 10 to automatically log in the Spikemark user (no password required), then each operator can be granted a local user account which is used to log into Spikemark. If the local account has admin rights, they will be able to edit a show file. If the user doesn't have admin rights, they will only be able to load and run show files. Let's get started with the steps for user authentication installation.

1. Turn on your computer and log into the Windows user account named Spikemark.

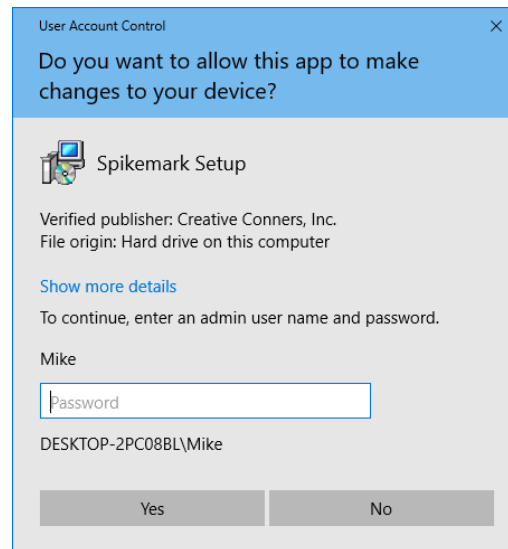


2. Locate the Spikemark Installer and double click.

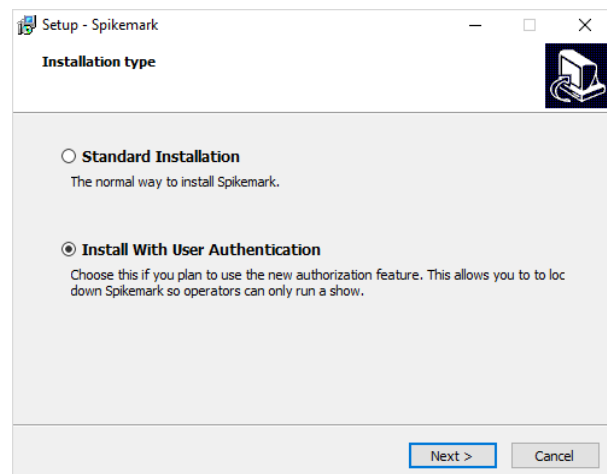


3. The User Account Control window will pop up. You will need to enter the password for the Admin (in this case the admin username is Mike).

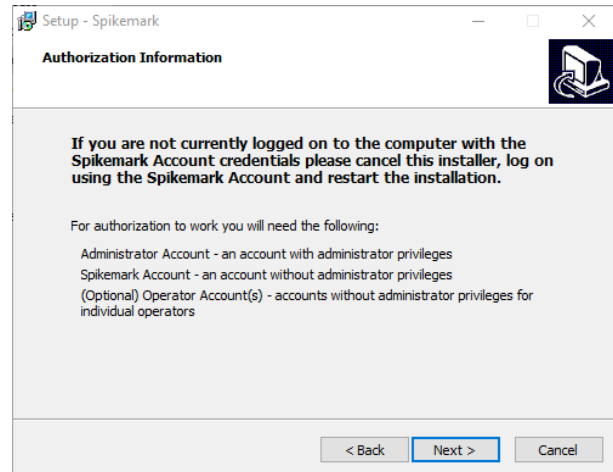
Enter the admin password and click Yes



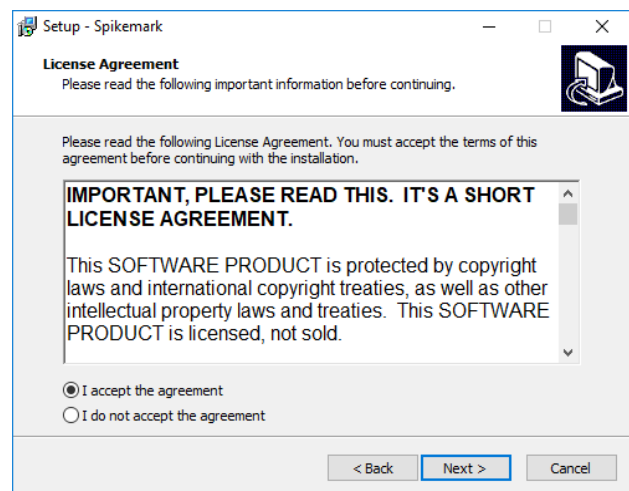
4. Select Install With User Authentication and click Next>.



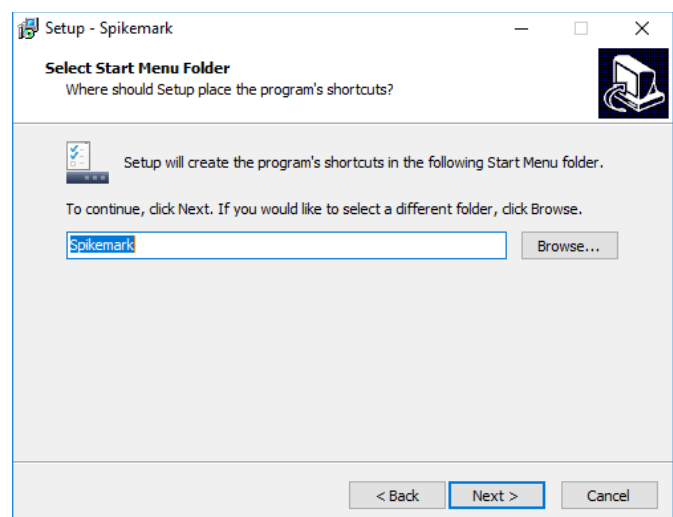
5. Confirm the current user is Spikemark and that the user structure is correct and click Next >.



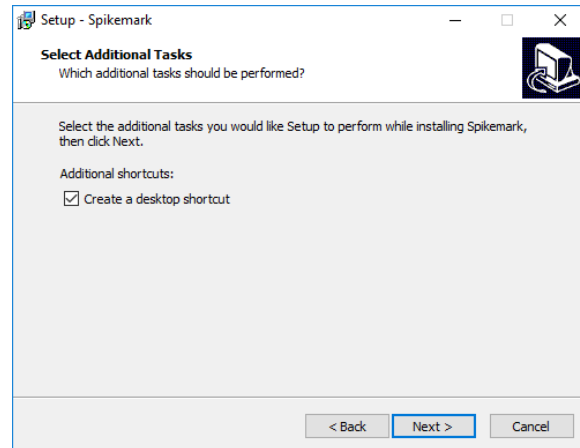
6. Read and accept the License Agreement, then press Next>.



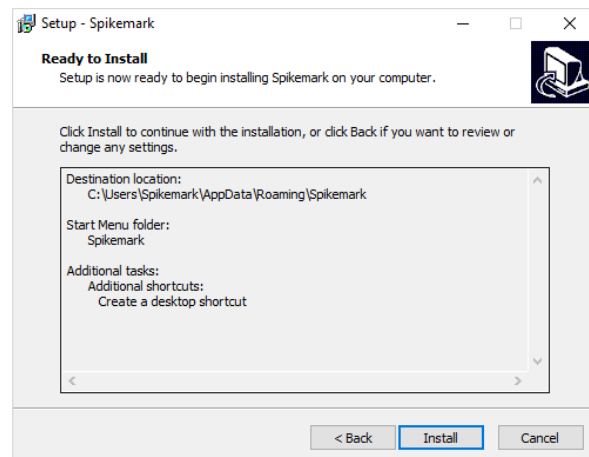
7. Click Next> to accept the default Start Menu location.



8. If you would like a desktop shortcut, ensure that the box has a checkmark in it, then select Next >.

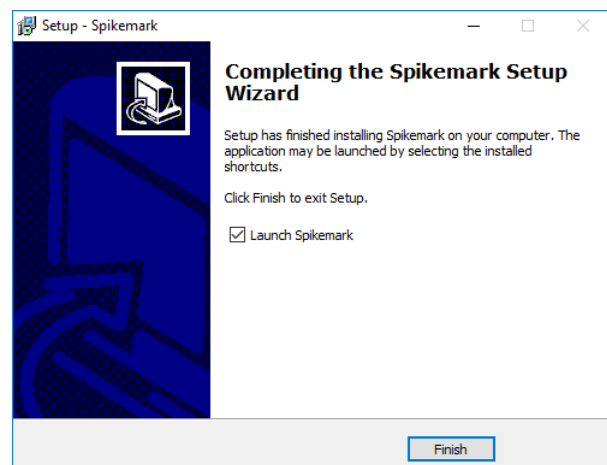


9. Confirm all installation information is correct and click Install.



10. A status window will appear with a progress bar, an additional window may pop up and disappear as well. Once the installer is finished you will see this window:

Un-check the Launch Spikemark box if you do not want to run the program immediately, then click Finish.



11. If you chose to Launch Spikemark, the program will open with the default show open.

INSTALL LOCATION AND SUPPORT FILES

When Spikemark is installed with Authorization, the installed file will be saved in the user directory who was logged in at the time of installation; in our case that was the Spikemark user. All Spikemark program files and machine firmware files are located here:

'C:\Users\Spikemark\AppData\Roaming\Spikemark'

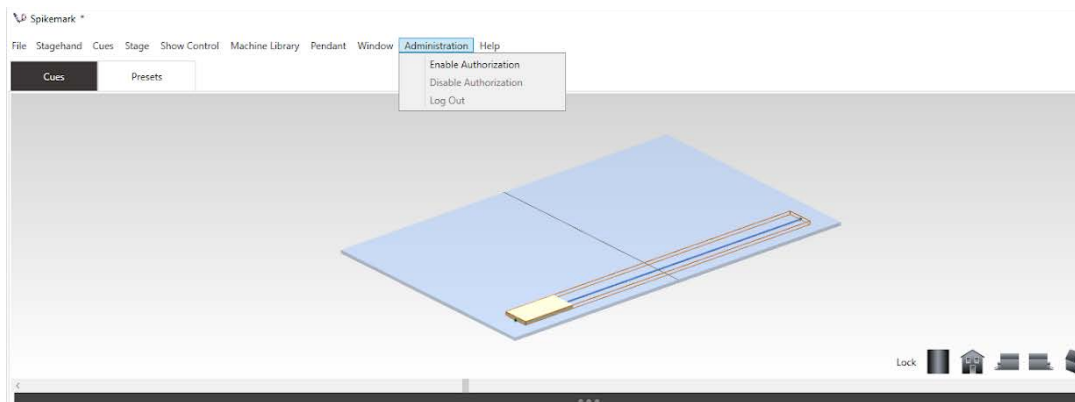
All log files will be located here:

'C:\Users\Spikemark\AppData\Roaming\Creative Conners, Inc\Spikemark\Spikemark version(X.X.X.X)'

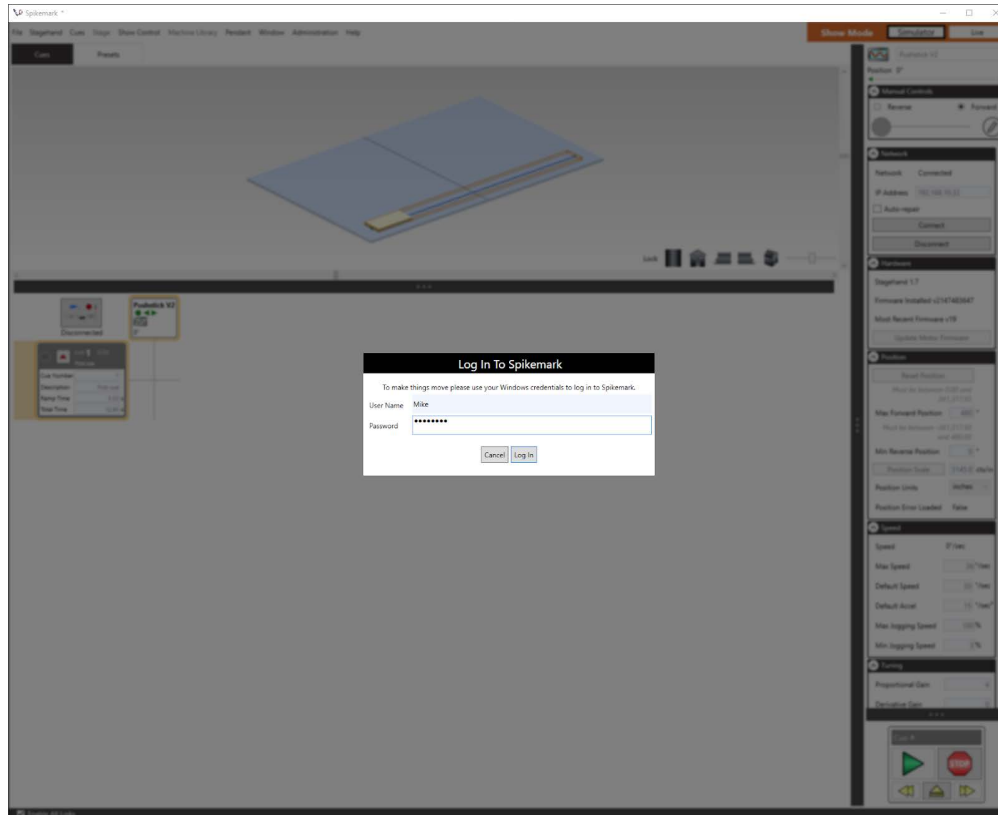
ENABLING AUTHORIZATION

While still logged into the computer under the Spikemark user, open Spikemark. You will notice that nothing looks different - as a matter of fact Spikemark operates as expected. In order to take advantage of the features, you need to enable them from within Spikemark.

1. From the Administration menu select enable Authentication



2. You are prompted with the 'Log In To Spikemark' screen. Enter the credentials for any user with Admin rights - in this example the username is Mike.



With Authorization enabled, anytime Spikemark is started the user will be prompted with the Spikemark login prompt. At this point, any user is able to enter their credentials and begin using Spikemark.

Once Authentication is enabled and you are logged in with an Admin account, the 'Administration' menu will allow you 2 options:

- Disable Authorization
- Log Out - Logging out will log out the current user and prompt for a new username and password.

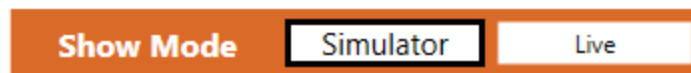
Disabling Authorization will do exactly that - no longer do you need to log into Spikemark in order to make changes. To make this change you will need to enter admin credentials from the Spikemark Login prompt.

SPIKEMARK HIGHLIGHTS

Spikemark 4 has a number of great features. Improving on the legacy, Creative Conners, Inc provides the easiest software to use when controlling stage automation. Spikemark's name also highlights one of its handiest features: Spikes. The following are a selection of existing favorite features and some of the great, new improvements found in Spikemark 4.

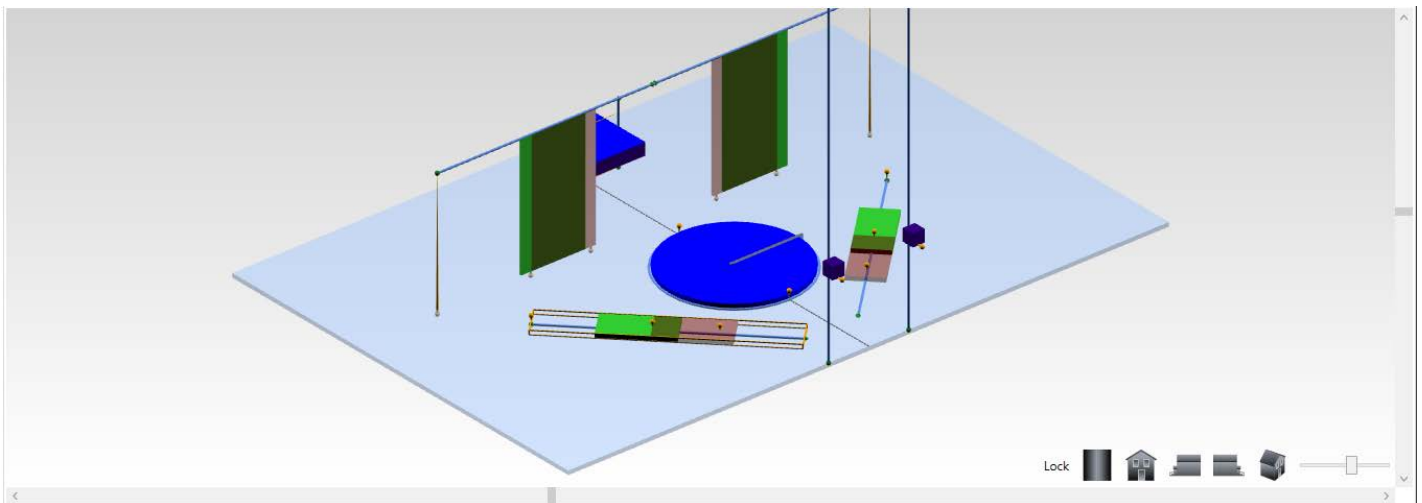
SIMULATOR

Simulator allows the user to virtually run cues and movements, seeing the outcome on the screen before moving real machinery.



3-DIMENSIONAL STAGE VIEW

The Spikemark Stage Model Viewer gives a three-dimensional view of the theatre space. Wagons and turntables can be rotated along any axis, making it easy to view lifts, curtains, and deck winches in a simple but realistic fashion.



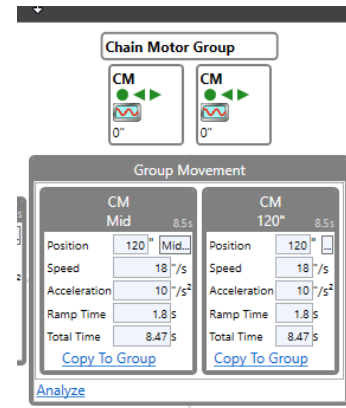
MACHINE LIBRARY

Spikemark's Machine Library makes it easy to start a new show. Simply drag and drop pre-configured machines in the main window. By default, the Machine Library is loaded with all of the Creative Conners stock machines and you can easily add your own machines to the library. Using the Machine Library eliminates tedious motor configuration and gets you writing cues fast.



GROUP MOTION

Spikemark 4 supports grouped motion for any axes in the show - they can be deck winches, hoists, lifts or even hydraulic effects. Once a motor is part of a group, motion will halt if there is a fault with any motor in the group. This is very handy when hoisting scenery with multiple machines.



DRIVE COMMUNICATION

Spikemark 4 offers several tools to communicate with compatible Stagehand Controllers. From within Spikemark, the user can view real time Frequency and Amperage for any movement used with an AC induction motor - this tool can help identify a physical obstacle in a deck track or an overloaded hoist. Auto-tuning and drive reset are also available - no need to throw an e-stop or get to the VFD keypad.

MEDIA SERVER INTEGRATION

Each year projections and video are becoming more commonplace, and Spikemark is ready to easily synchronize video content with moving scenery by streaming position information over the network in several popular formats. Choose from the tried and true WATCHOUT UDP format, PositStageNet (the fine folks at disguise -formerly d3 technologies- like this format) or Open Sound Control (OSC) formats. Between these three options, Spikemark is able to output position data to most major video or lighting systems. In addition to streaming live position data, Spikemark can also output OSC commands to trigger cues on other systems.

EXTERNAL TRIGGERING

Spikemark is capable of communicating with non-Creative Conners, Inc software and devices. While Spikemark **cannot be triggered by these outside sources**, other effects such as lighting or projections can be triggered from Spikemark.

STAGEHAND MESSENGER

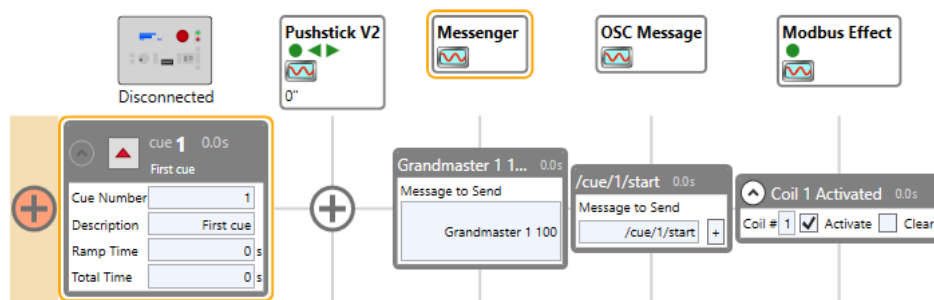
Along with video systems, sometimes you need to integrate your automation with other departments. The Stagehand Messenger gives you the ability to send short text strings out to any device that is listening on the network.

STAGEHAND MODBUS EFFECT

The Stagehand Modbus Effect gives you another tool to communicate with systems outside of Spikemark.

OSC MESSAGE

The OSC Message unlocks the potential for Spikemark to give the Go command to any system that can listen to OSC commands. This opens up a new world of synchronizing cues across multiple platforms.

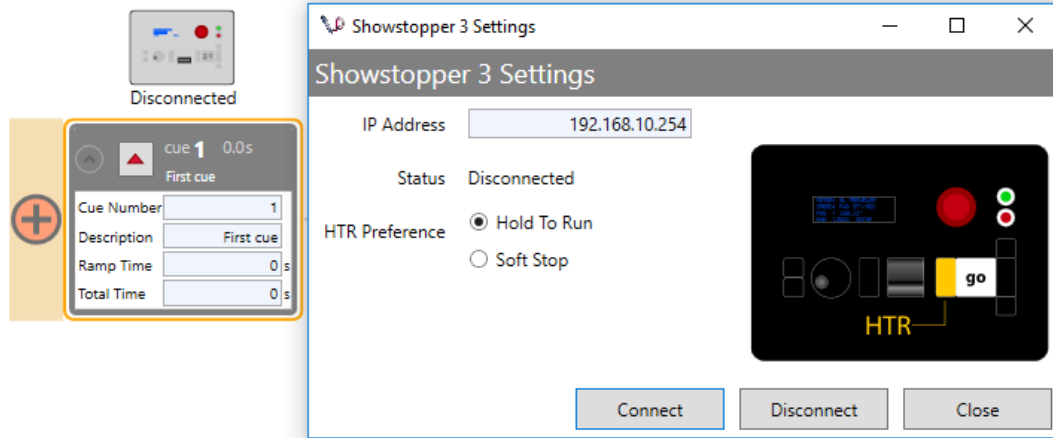


SHOWSTOPPER ACCESSORY SUPPORT

The Showstopper 3 is the Creative Conners, Inc line of e-stop products that work together to give you a flexible system of e-stop control that is easy to set up throughout your venue. Every e-stop system needs a Showstopper Base. The Showstopper 3 Base is built with the ability to add on accessories such as the Showstopper 3 Console, Spikemark Pendant, and the Showstopper Remote. The Showstopper 3 Console and the Spikemark Pendant gives you the ability to control machines that have been configured in Spikemark. Although Spikemark still works with the original Showstopper, we wholeheartedly recommend upgrading!

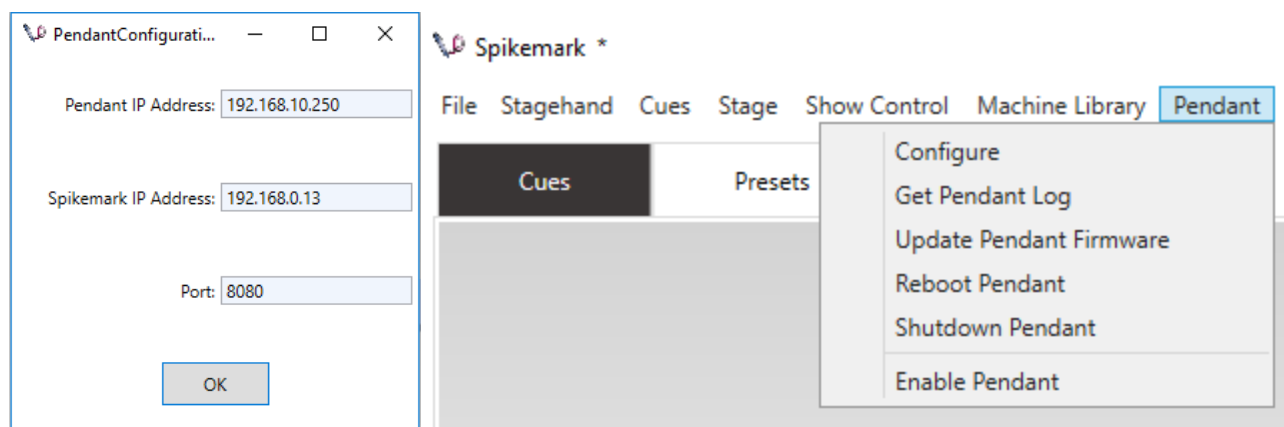
SHOWSTOPPER 3 CONSOLE

The Showstopper 3 Console connects to Spikemark through the same Ethernet network as all of the Stagehand controllers. The Showstopper 3 Console has jogging controls, a four-line status display, optional Hold-To-Run functionality, as well as standard cue controls and Emergency Stop. Connection to the new Console is made through the Showstopper 3 settings dialog.



SPIKEMARK PENDANT

Spikemark 4 includes the ability to connect to the Spikemark Pendant. The Pendant is a network connected remote which allows emergency stopping axis selection, manual jogging, and Jog to a Spike. You are no longer tied to the operator station while moving machines!



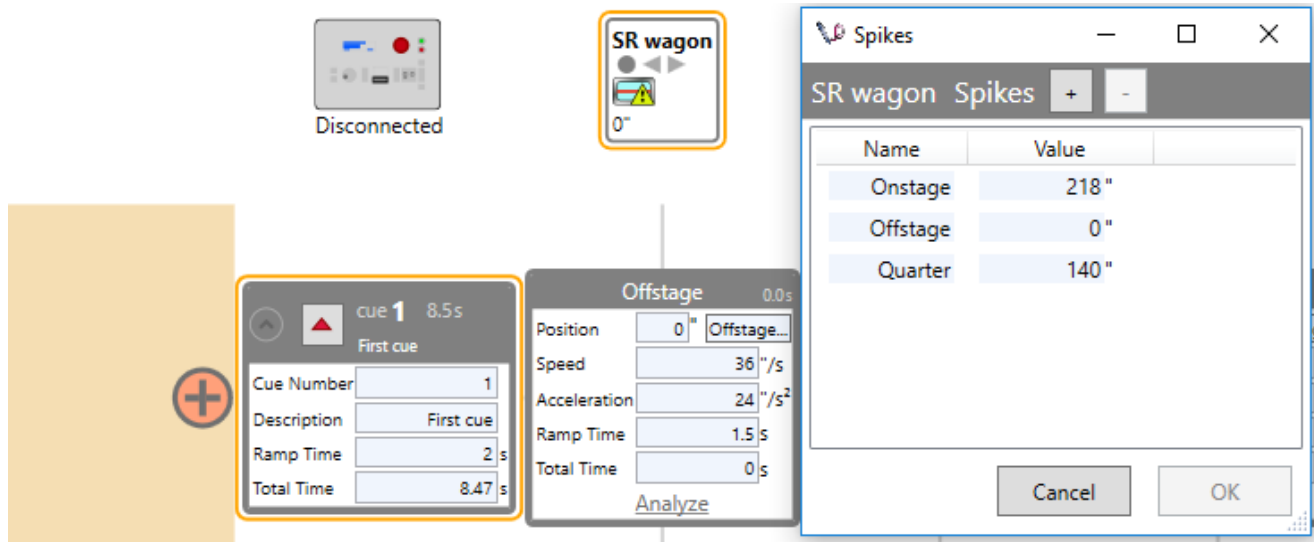
CUEING TOOLS

Cues are the backbone of Spikemark, but there are many different tools that not only make it easy to create and use cues, but also to move scenic units to the correct position.

SPIKES

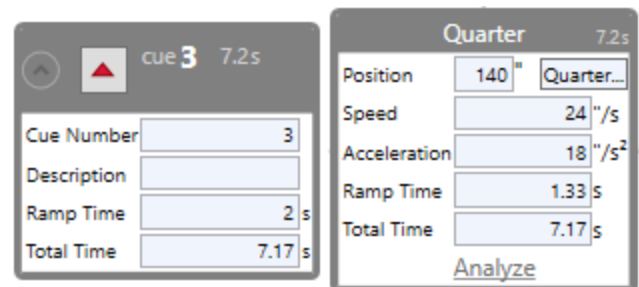
The Spikes feature is designed to mimic the usefulness of real spike tape. Rather than trying to remember bizarre cue position numbers (such as 251.13”), you can now assign names to commonly used positions (‘on stage’ = 251.13”). When writing cues, you can select a position from the motor’s defined spikes.

Often during the rehearsal process, the spike positions need to be tweaked. If you were physically pushing the wagons around, you would move the spike tape on the stage floor to a new position. Similarly, with the Spikes feature, you simply edit the position of the spike in one place in Spikemark and all of your cues that use the spike are automatically updated. This saves you from manually tracking changes through each cue in your show.



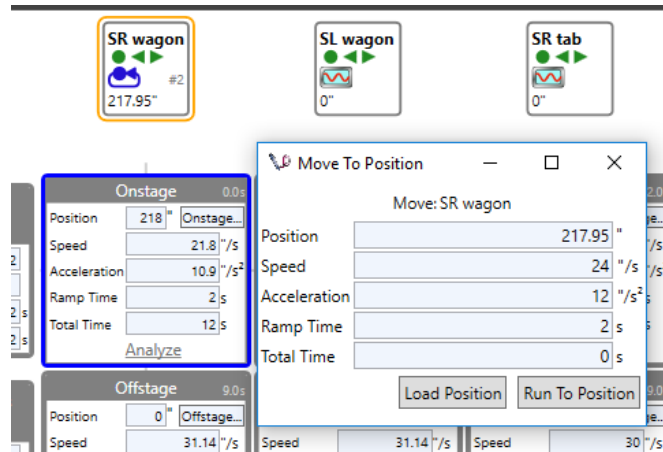
TIME-BASED CUES

In Spikemark, cues can be written two different ways. If you write cues by using time values, simply enter the Total Time and Ramp Time. Quickly writing cues that match the timing of the show helps reduce tech-table stress. The other way you can write cues is by inputting speed and acceleration values. You can even use both ways of writing cues to be the most convenient workflow for you. Spikemark does the math for you.



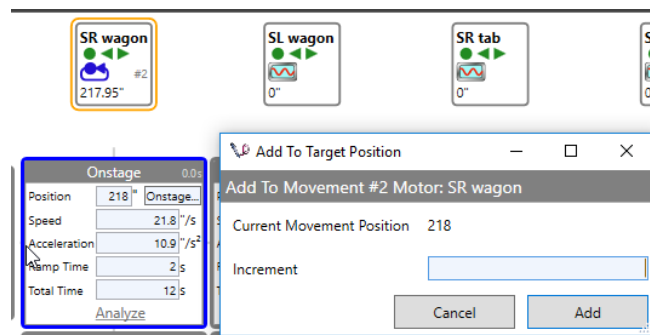
MOVE TO POSITION

Occasionally, it is necessary to move an axis to a specific, though not cued, position on stage. This can be done by manually jogging from the on-screen slider, the Console, Pendant or directly from the Stagehand, though the precision is generally not excellent. Move to Position is a great tool for when you need to move a piece of scenery to a precise location at a specific speed but not controlled by a cue. Right click on the axis header and choose Move to Position from the context menu, enter the position and speed values, and execute the move. This feature also works for grouped motors and children within groups.



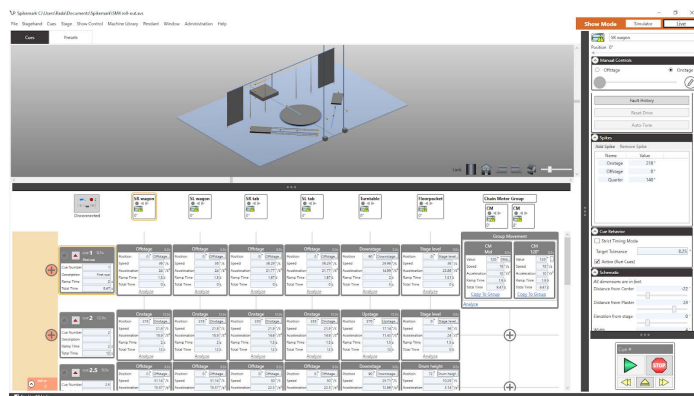
ADD TO POSITION

The Add to Position feature makes it super simple to add or subtract a specific number of units to the target position of a movement. The feature is really handy when assembling video walls. Just right click on the movement you want to add to, add the value (positive or negative) and click OK. The next time that cue is run it will move to the new target.

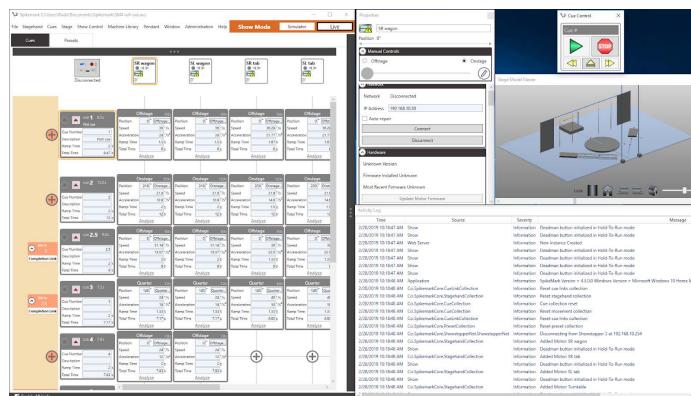


STREAMLINED INTERFACE

Spikemark's interface is simple and easy to navigate. The main window has Splitter Panes, which allow you to create a computer workspace that works best for you. We have designed the default layout to make it easy to access the more commonly used features. These features can be rearranged to make them easier to reach.



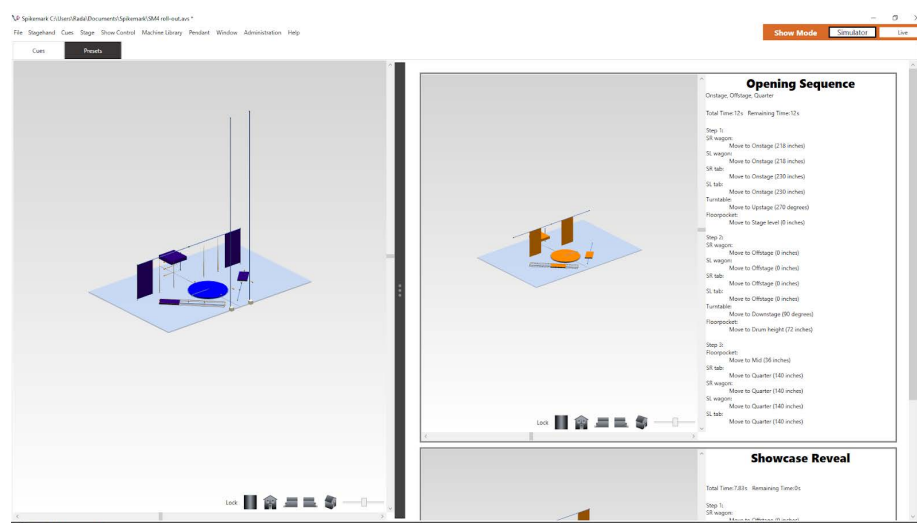
Integrated Layout



Custom Window Layout

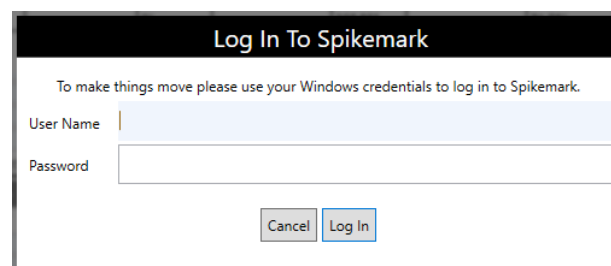
PRESETS

The Presets feature is another way to simply recall a cue state with the touch of a button. Though this is available for all situations, it is most useful for permanent installations.



USER AUTHORIZATION

This feature allows different users to have different access levels in Spikemark. Spikemark uses a username and password to dictate which users have what specific access. It is a handy way to assure the show file cannot be inadvertently changed once the show is frozen. This feature is chosen at the time of installation.



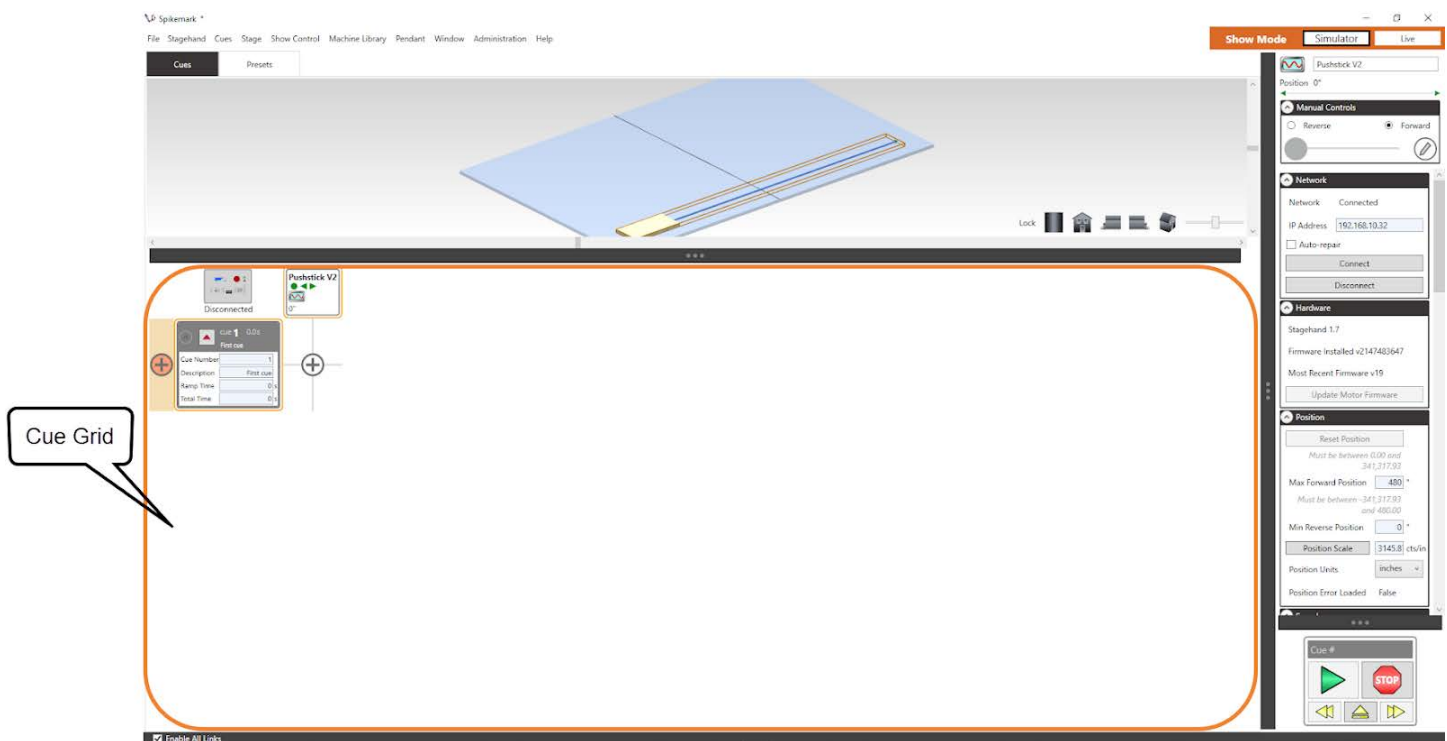
GETTING AROUND SPIKEMARK

Spikemark was designed to be a powerful yet intuitive tool to help augment your performances. While many of the elements are out in the open and obvious, there are many features that may not be as well known. Let's dig into these less known features and locate where you can access these wonderful features.

SPIKEMARK'S MAIN SCREEN

DEFAULT SHOW

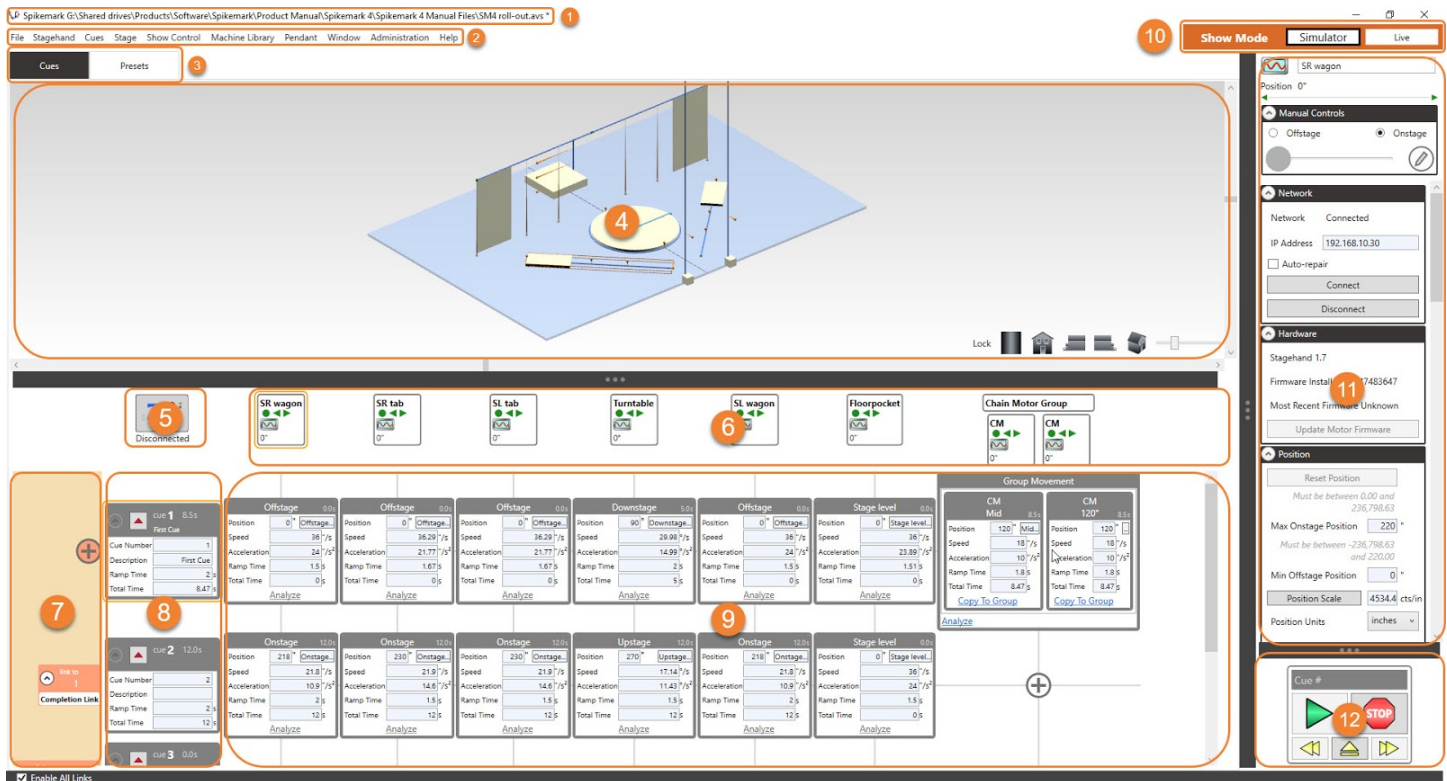
When you first install and open Spikemark, we try not to throw you into an abyss without anywhere to go. Rather, you start out viewing the **Cue Grid** with a Pushstick V2 machine and Cue 1. This is the primary screen where you can manipulate what devices you have available and adjust the cue sequence.



To give you a better idea of what a show would look like, we are going to use a showfile that already has multiple axes of motion and several cues. If you would like to follow along on your own computer, download this demo file http://cci.fyi/SM4_Roll-Out.

Spikemark has two main screens that you can choose from. First, is the **Cues Main Screen**. This is the default view and shows the **Cue Grid** where the majority of programming takes place. The **Presets**


Main Screen shows you the Preset Grid and preconfigured “looks” that can be triggered for easy, convenient, and repeatable stage set-ups. Let’s take a look at the **Cues Main Screen** here:



1. **File Information** - Location and name of open file. An asterisk at the end means there is unsaved information in the file.
2. **Menu Bar** - Gives you access to the various tools and preferences of Spikemark.
3. **Main Screen Selection** - Choose between Cue Grid and Preset Selection.
4. **Stage Model Viewer** - Preview movements while in Simulator Mode, or track units in real time with Live Mode.
5. **Showstopper 3 Consolette Menu** - Control the network connection and mode of a Showstopper 3 Consolette.
6. **Axes of Motion** - Shows what machines are available.
7. **Links** - Trigger cues using various methods of links.
8. **Cues** - Allow for the creation of Movements and Links.
9. **Movements** - An independant movement can be added for each Axis of Motion and each cue.
10. **Show Mode Selection** - Safely edit cues without movement in Simulator Mode or connect to and control actual motors in Live Mode.
11. **Stagehand Properties Panel** - Allows setup values to be adjusted for any given Axis of Motion.
12. **Cue Control** - Mimics the functionality of a physical Showstopper, giving you the controls needed to run, skip and stop cues.

MENU BAR

FILE INFORMATION

 Spikemark G:\Team Drives\Products\Software\Spikemark\Product Manual\Spikemark 4\Spikemark 4 Manual Files\SM4 roll-out.av5 *

In the top left corner of each file you can find the exact location and the name of your showfile. In this example, the file is saved in 'G:\Team Drives\Products\Software\Spikemark\Product Manual\Spikemark 4\Spikemark 4 Manual Files', and the file name is 'SM4 roll-out.av5'.

Notice the asterisk in the top right corner. This is an indication that there are unsaved changes to the file.

As with any important document, remember to **save frequently**, and it never hurts to save a new version when you expect major changes, such as during initial tech rehearsals or technical walkthroughs. As an added precaution, use a flash drive to keep a backup file as well. This is especially useful if you have multiple computers.

File Stagehand Cues Stage Show Control Machine Library Pendant Window Administration Help

The Menu Bar is your main tool for navigation. We'll explain more details about each feature seen in these menus later, but for now, you just need the basics to get started. As with most modern programs, clicking on any of these menu items will open a dropdown menu with additional options. Inside each menu is a list of options on the left. Some of these menu options also have grey text on the right which are the keyboard commands to quickly access that menu option to speed up programming and to be used when not clicking inside that menu.

● FILE

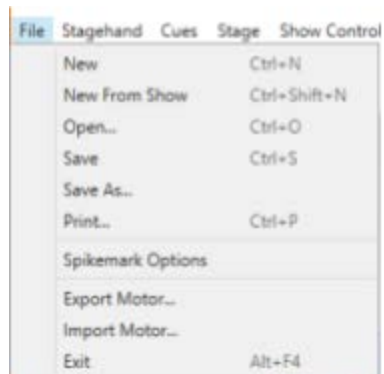
The File Menu deals with opening, saving, and changing items in your Spikemark show file.

File	Stagehand	Cues	Stage	Show Control
New				Ctrl+N
New From Show				Ctrl+Shift+N
Open...				Ctrl+O
Save				Ctrl+S
Save As...				
Print...				Ctrl+P
Spikemark Options				
Export Motor...				
Import Motor...				
Exit				Alt+F4

System Functions	
Hot Key	Function
Ctrl+N	New Show File
Ctrl+Shift+N	New From Show
Ctrl+O	Open existing file
Ctrl+S	Save the current file
Ctrl+P	Print
Alt+F4	Exit

● STAGEHAND

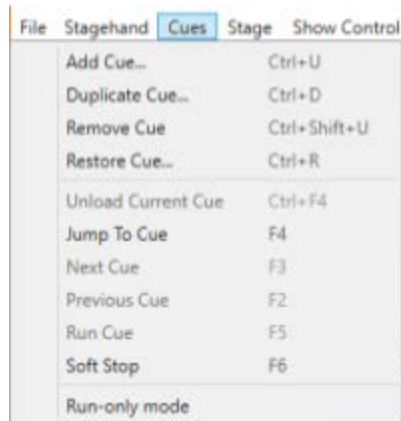
Spikemark is capable of controlling and communicating with many different machines over several different protocols. The Stagehand Menu is where you go to add these control features into your Cue Grid.



System Functions	
Hot Key	Function
Ctrl+N	New Show File
Ctrl+Shift+N	New From Show
Ctrl+O	Open existing file
Ctrl+S	Save the current file
Ctrl+P	Print
Alt+F4	Exit

● CUES

The bread and butter of any successful show (automated or not) are cues. The Cues Menu is one of several ways to access and manipulate cues. The keyboard shortcut commands (Hot Keys) in this menu are particularly useful.

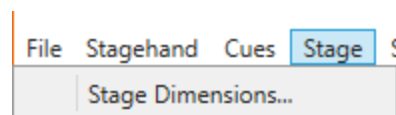


Cues	
Hot Key	Function
Ctrl+U	Add Cue
Ctrl+D	Duplicate Cue
Ctrl+Shift+U	Remove Cue
Ctrl+R	Restore Cue

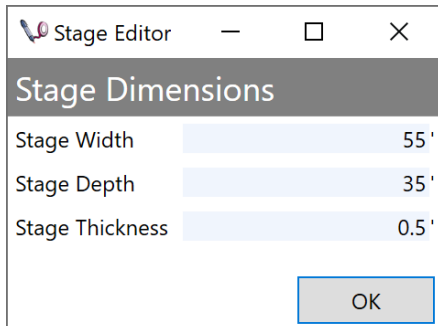
Cue Control	
Hot Key	Function
Ctrl+F4	Unload current cue
F4	Jump To Cue
F3	Next Cue
F2	Previous Cue
F5	Run Cue
F6	Soft Stop

● STAGE

Every axis of motion can be visually configured for the Stage Model Viewer. The Stage Dimensions... menu item, located inside of the Stage menu allows you to change



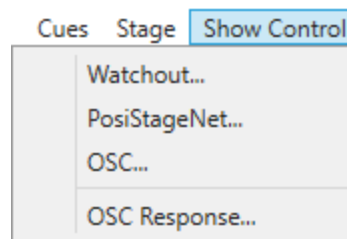
the width, depth, and thickness of the stage.



All dimensions are entered in decimal feet. For instance, the default stage thickness is 0.5' or 6"

● SHOW CONTROL

The Show Control Menu allows you to enable position information output using industry standard protocols.



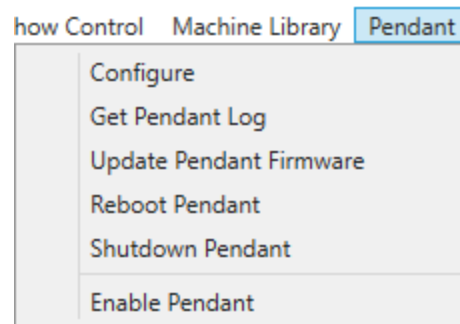
● MACHINE LIBRARY

While it may not be your typical drop-down menu, the Machine Library is where your mechanical machines are stored. Spikemark comes stocked with preconfigured Creative Conners machines, but you can add custom machines and remove unnecessary machines, customizing the library to your needs.



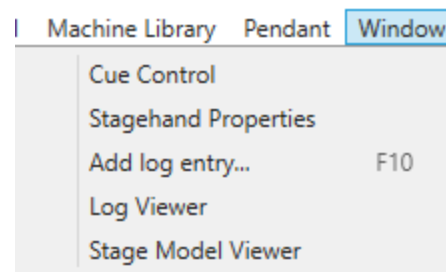
● PENDANT

The Spikemark Pendant is one of the newest developments that is supported by Spikemark 4. The Pendant Menu gives access to its configuration.



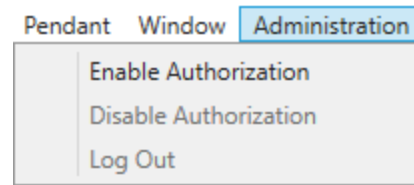
● WINDOW

The Spikemark Main Screen can be customized by using the Window Menu. This allows each view to be opened as a separate, floating window.



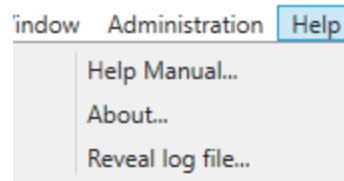
● ADMINISTRATION

Spikemark 4 introduces a new level of security by using Authorization. The Authorization Menu allows you to enable or disable this function, and to switch users when active.



● HELP

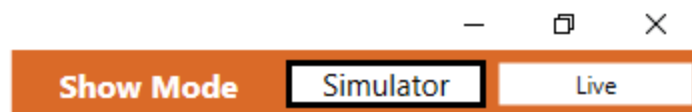
The Help Menu gives you information about the current version of Spikemark, and shows you where to find the log files to send in when you're stuck.



MODE SELECTION

SHOW MODE SELECTION

Simulator, as the name suggests, simulates physical machinery on a virtual stage letting you run cues and jog scenery around without being connected to any physical motors. Simulator is a great way to get familiar with Spikemark without the need to set up heavy equipment. Simulator is also an excellent pre-visualization tool. You can use it to work through different cueing ideas at the tech table, in a design meeting, or on your couch. All of your hard work in simulator mode has paid off by simply switching to Live Mode. Live mode is where you will be able to control your physical machinery. You will need to be connected to your physical machinery though your Stagehands to see Spikemark control your effect in Live Mode.



MAIN SCREEN SELECTION

Just below the Menu Bar, you can find the Main Screen Selector. As mentioned before, there are two Main Screens that you can choose from. The Cues Tab will give you access to the Cue Grid,



and Presets Tab will give you access to the Preset Grid.

CUE GRID

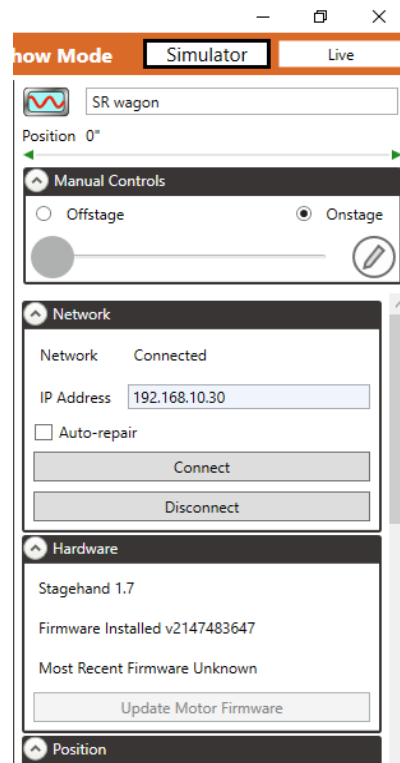
The majority of your Spikemark programming and operation will take place in the Cue Grid. This is where you can add and remove cues, change cue numbers (yes, decimals are fair game), and adjust what each movement does.

PRESETS

The Presets screen was developed for use with museums and other permanent installations in mind. It's a convenient way to load and execute cues without the complexity of the cue grid.

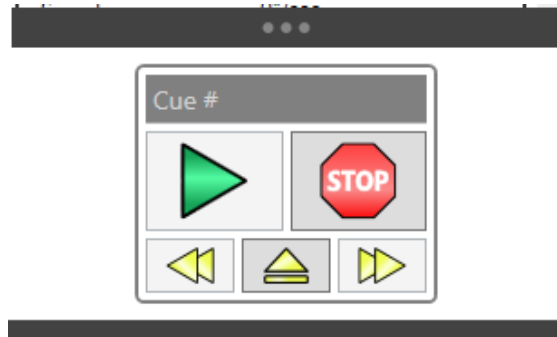
STAGEHAND PROPERTIES PANEL

The Stagehand Properties Panel on the right side of the screen allows you to edit all of the configuration values for any motor or group in the show.



CUE CONTROL

The on screen Cue Controller is located in the bottom right hand corner of both of the main screens, just below the Stagehand Properties Panel.



SPLITTER PANES

Splitter Panes allow you to adjust the size of the sections of the Spikemark screen (the Stage Model Viewer, the Stagehand Properties Panel, the Cue Controller, and the Cue Grid). Click and drag on the Splitter Panes that separate each section. To fully collapse a pane, double-click on the Splitter Pane. To expand a collapsed pane, double-click again on the Splitter Pane.



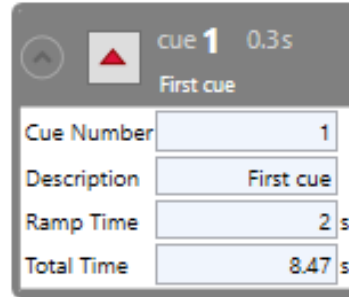
SELECTION AND INPUT

As we go through the various screens, you'll want to select and put information into various fields. Just like with most computer programs, you can left click and right click just about anywhere to achieve various actions.

- Left Click
 - Typically, Left Clicking is used to select an option or activate an input field.
- Double Click
 - Left clicking twice quickly in succession on the Splitter Panes will automatically collapse and expand the associated window area.
- Right Click
 - Typically, Right Clicking opens a contextual menu for various options related to the object or area being clicked.

INPUT FIELD

Input fields are identified by having a light blue background. Each of these fields allows for either alphanumeric or numeric input. For example, in the Cue Box below, there are 4 input fields, Cue Number, Description, Ramp Time, and Total Time. The Description Input field uses an alphanumeric input and the Cue Number, Ramp Time, and Total Time use a numeric input.



The screenshot shows a 'Cue Box' interface. At the top, it says 'cue 1' and '0.3 s'. Below this, there's a 'First cue' label. The main area contains four input fields: 'Cue Number' with the value '1', 'Description' with the text 'First cue', 'Ramp Time' with the value '2 s', and 'Total Time' with the value '8.47 s'. Each input field has a light blue background.

CONFIRMING DATA

When inputting data there are two methods for confirming or saving that information into that field.

- TAB

After the data has been entered, press the tab key. This will automatically cycle to the next input field, and confirm the previously entered information.

- CLICK EMPTY SPACE

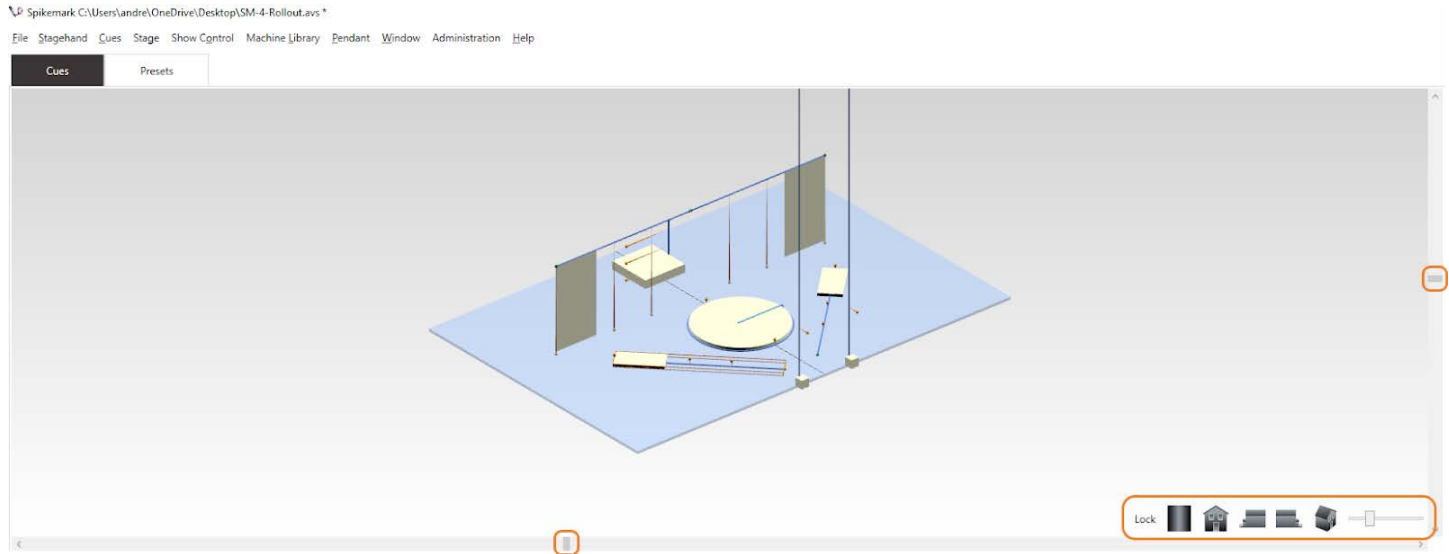
The primary background of the Cue Grid is white. Left click in this white/empty space once to remove the cursor from the input field, and confirm the entered information.

NOTE:

Do not click into another field right away - Clicking into another input field after entering data will sometimes fail to confirm that data, resulting in no change.

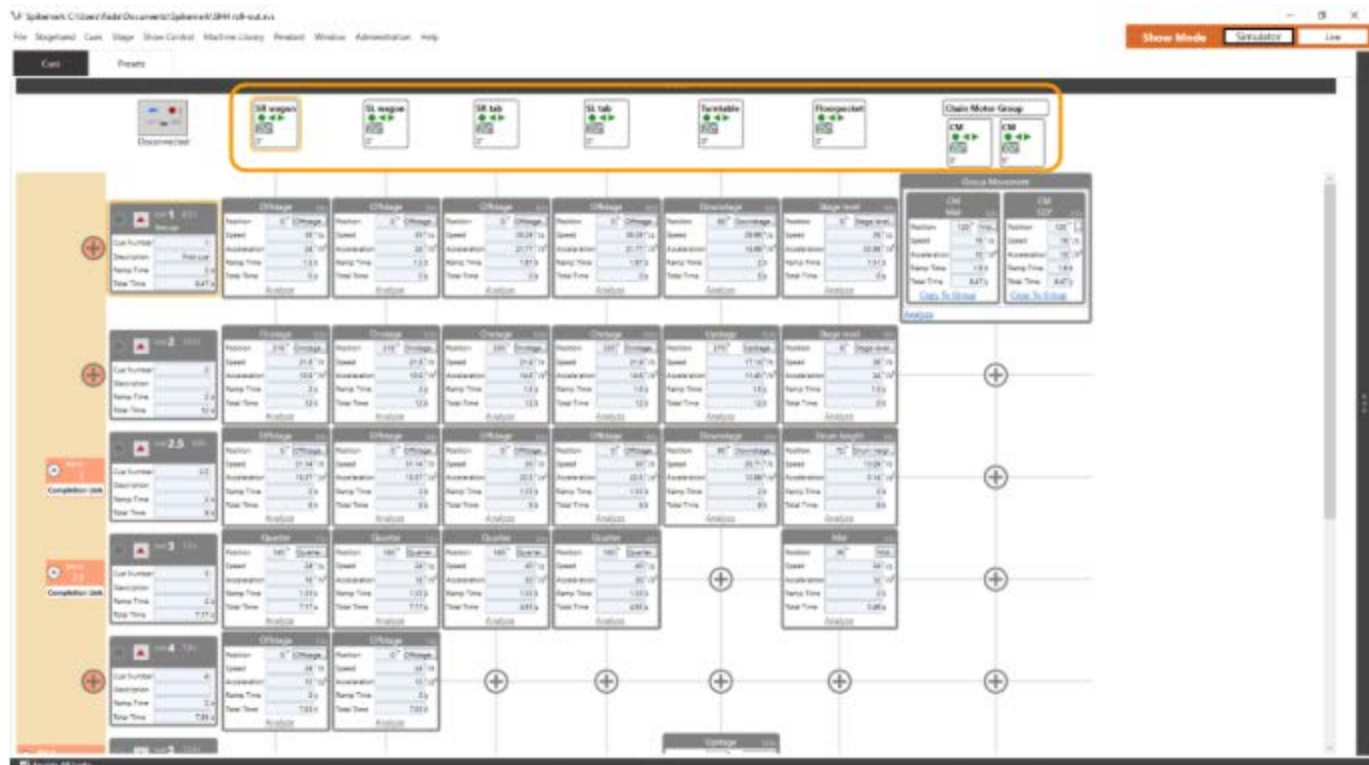
STAGE MODEL VIEWER

The majority of the top of the screen, just below the Menu Bar and Main Screen Selection, is where the Stage Model Viewer (SMV) sits by default. Click and drag up and down on the Splitter Pane below the SMV to control the size. Views can be controlled by the slider bars on the bottom and right sides, as well as the various buttons in the bottom right corner.



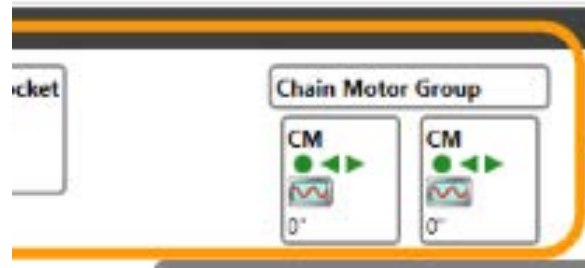
AXES - MOTORS AND CONTROLLERS

When you add different machines or controllers to the Cue Grid, there is a new icon created at the top for each one. Below you can see SR Wagon, SL Wagon, SR Tab, and so forth. Each icon can be left clicked to be selected, which will be indicated by an orange border (currently around the SR Wagon). When selected, the Stagehand Properties Panel will be populated with information specific to that axis, allowing you to make adjustments. You can also right click these icons for a pop-up window of actions.



MOTION GROUPS

On the far right you can also see Chain Motor Group, which looks a little bit different than the other axes. Spikemark 4 introduces **group motion** which allows different axes of motion to be selected as a single unit. Note that the same information and format is presented as an independent axis, but with different borders to indicate the grouping.



AXIS ICON DETAILS

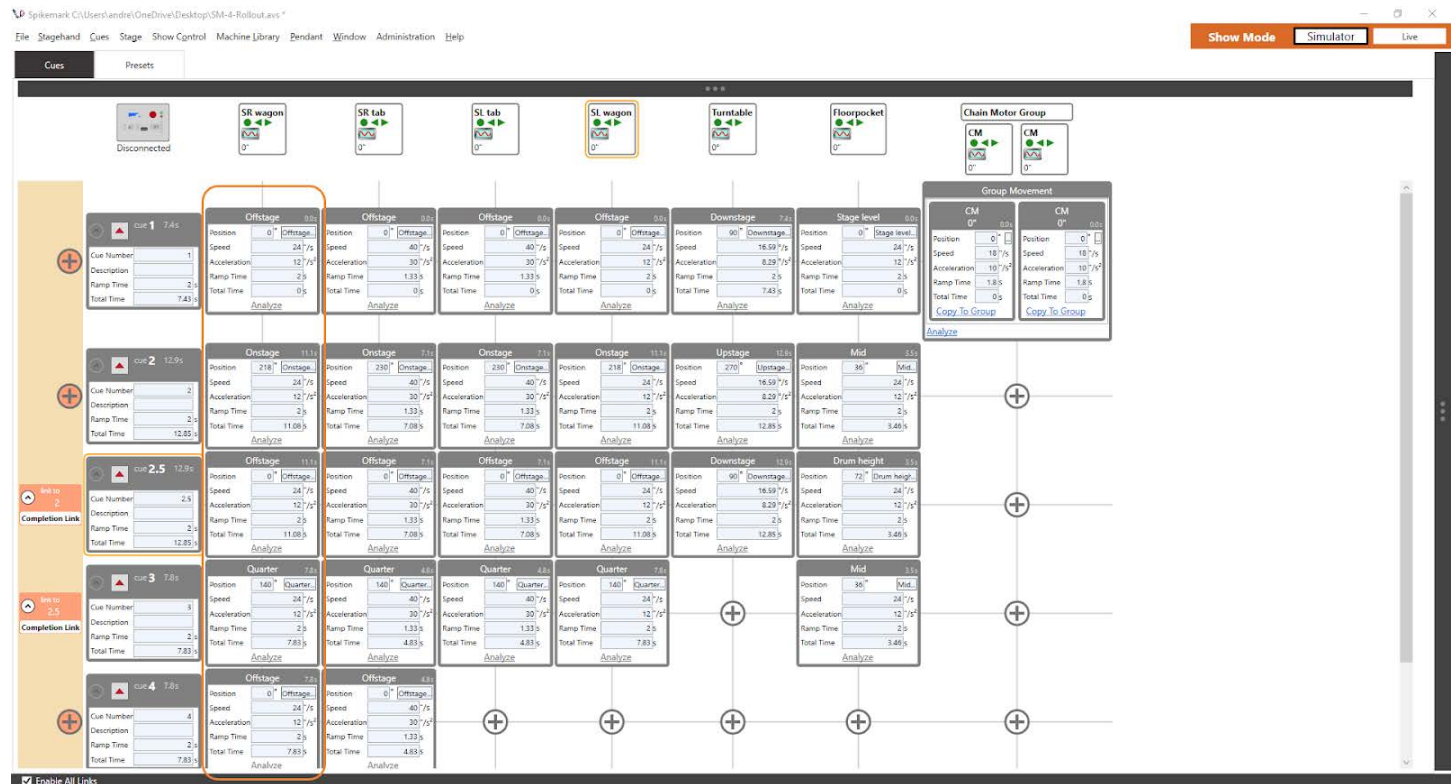
On each axis icon, you have a wealth of information and feedback. Below, we have selected the SL Wagon unit.

- 1. Axis Name** - This indicates what unit you currently have selected.
- 2. Connection Status** - Green = Connected; Yellow = Attempting to Connection; Grey = Disconnected.
- 3. Hard Limit Status** - The left arrow indicates the reverse limit and the right arrow indicates the forward limit. Green = limit is not engaged. Red = limit is engaged/triggered.
- 4. Status** - This icon changes depending on various status actions. The wavy line is a “heartbeat” monitor, indicating that the Stagehand is connected, but idle. Additional Status Symbols can be found in the Stagehand Properties Panel section of this manual.
- 5. Position** - This is the location of the unit from a specific reference point. In this view the Unit Position is indicating 0 inches. This means the SL wagon is at its reference point of 0”.
- 6. Selected Border** - This orange border indicates that we have selected this specific unit.



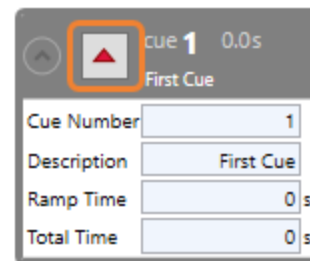
CUES

Down the left side of the Cue Grid are the actual cues. These are organized by increasing numerical order from top to bottom with zero being the smallest. There is technically an upper limit as well, but it is quite large. You can also use an absurdly large number of decimal places if you need to start inserting between previously created cues. To reorder cues, simply change the cue numbers and they will move themselves. You can left click to select a cue, and right click to open a pop-up window of cue actions.



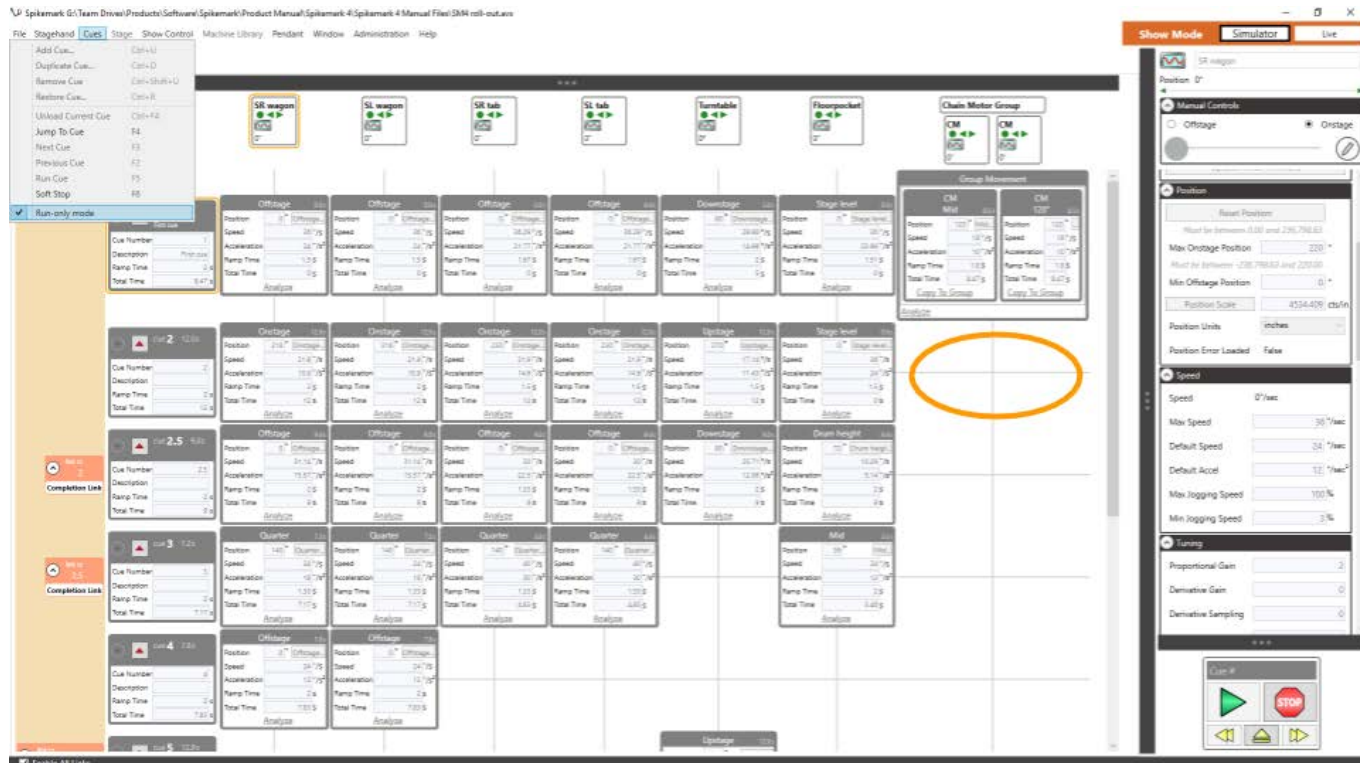
In the top left corner of the cue box is a black chevron inside of a grey circle (see below). Clicking this will collapse or expand the cue box to show or hide the white input area. You can also click anywhere on the dark grey background at the top of the cue to toggle this view. Note that clicking either of these will select the cue, indicated by the orange outline.

Left click on the light grey square with a red triangle to load the cue.



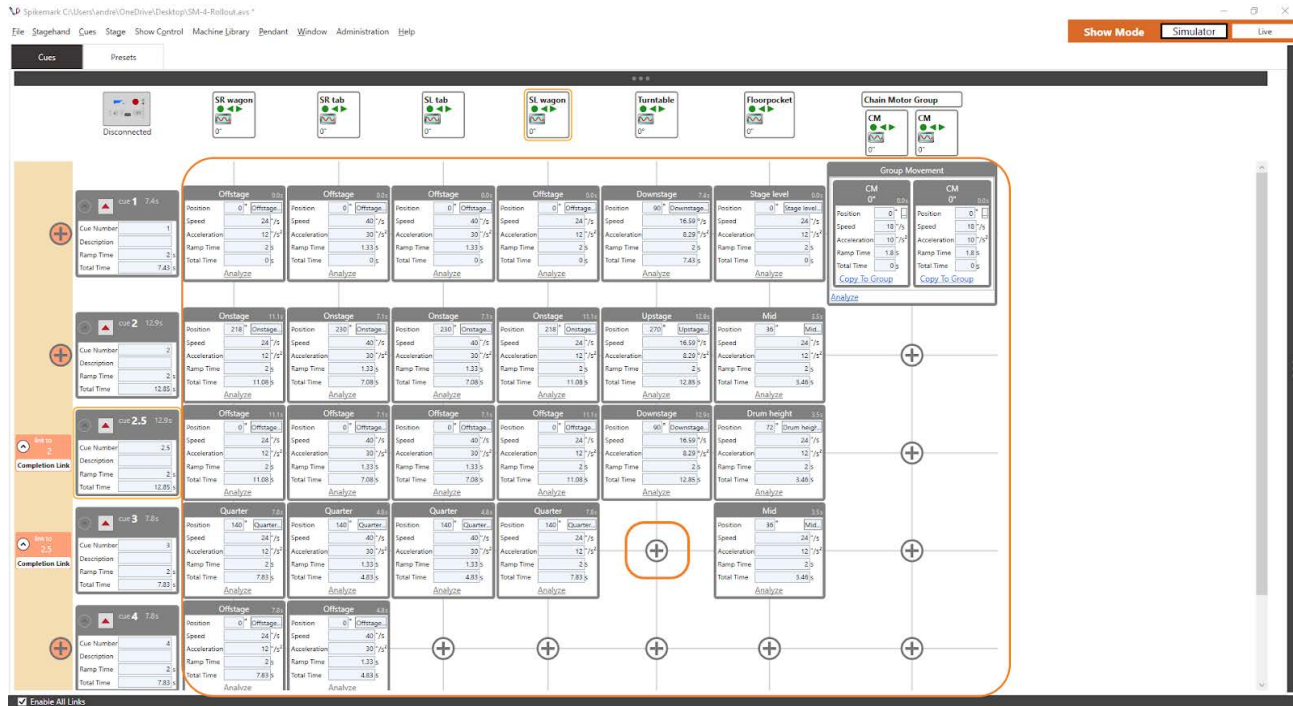
RUN ONLY MODE

Once a show has been programmed and finalized, it's pretty rare to want to change anything during the run. Enabling Run Only Mode will disable input fields, stage editing, adding machines, cues, movements, and links. This mode can be turned on and off by clicking on the **Cues** menu, and then clicking on Run-only mode at the very bottom of that menu. A check mark beside it will indicate that Run Only Mode has been activated, and you'll notice that the Add Movement plus signs disappear, and input fields as well as text are greyed out.



MOVEMENTS

Movements (indicated inside of the orange box below) are really what populate the cue grid as cross references between cues and axes of motion. For each cue, you can assign a movement to each axis by clicking on the circled plus sign. In the example below, we have cross referenced cue 3 and the Turntable axis to see that currently there is no movement of the turntable in cue 3.



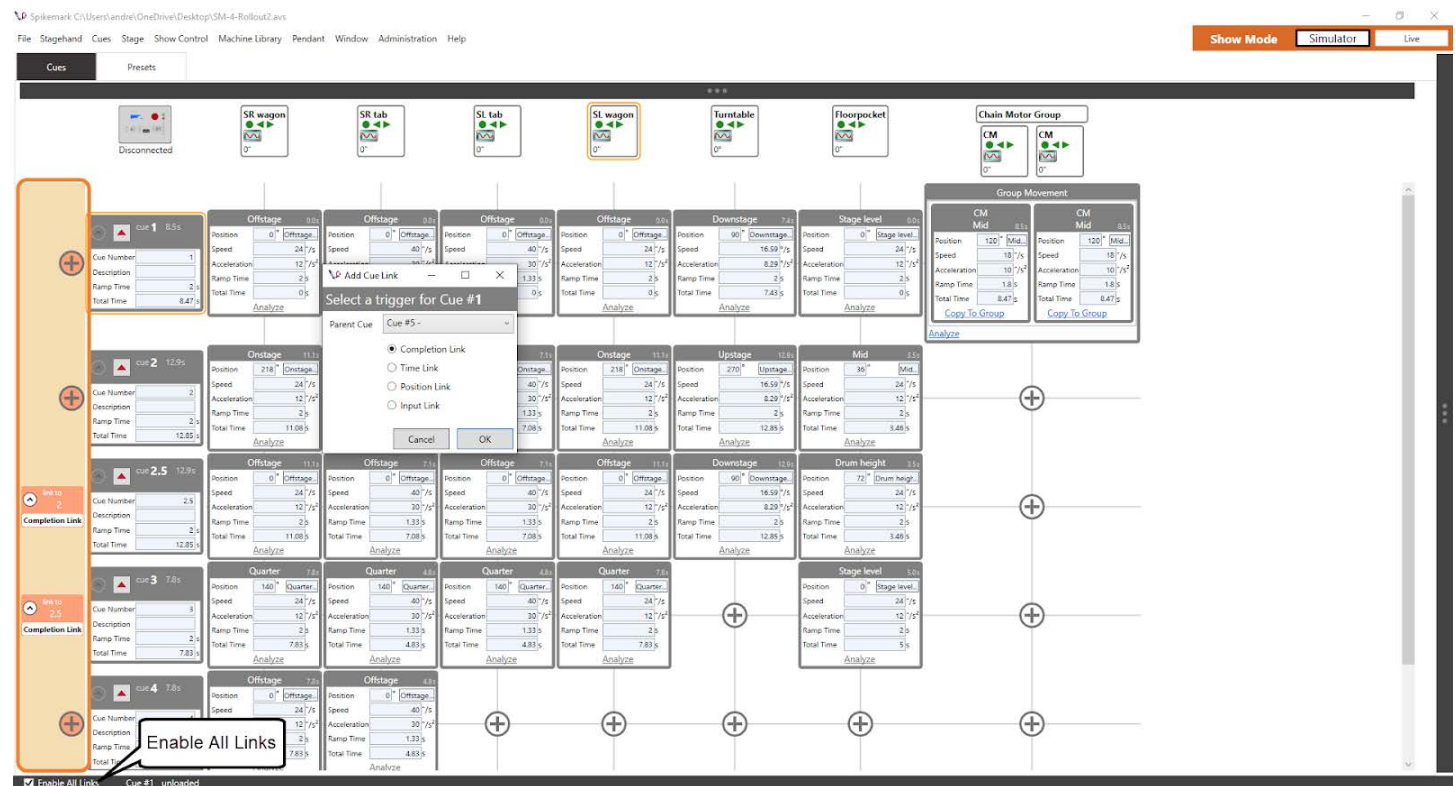
Just like with cues, you can left click on the dark area of a movement to collapse or expand the movement box. If you expand or collapse a cue, the movements will follow suit, like Cue 2 below. If you expand or collapse a movement, only that specific box will be altered like in Cue 3 below.



LINKS

Cues are typically triggered by an operator manually loading a cue, followed by pressing Go to execute. For more complex sequences, getting the timing just right can become a burden. Links allow a cue to be triggered by something else, such as another cue or even from a Stagehand FX input.

On the far left side of the Cue Grid is a light orange bar with light orange circles enclosing a plus sign next to each cue. Click on the light orange circle to open the Add Cue Link and select the desired options.



SHOWSTOPPER 3

The Showstopper 3 Console is an excellent tool for running shows. To access the Showstopper 3 Settings window, left click on the Console icon in the top left corner of the Cue Grid. Below the icon is the connection status. It will say Disconnected, Connecting, or Connected.

(Note: if you're not using a Showstopper 3 Console, ensure that it shows Disconnected as the status below the icon.)



CUSTOM WINDOW LAYOUT

If you don't like the standard layout of the Cue Grid with the Stage Model Viewer above, or the Stagehand Properties Panel to the right, you can customize what windows you see and where you put them.

LOG VIEWER

The Activity Log can be viewed in a couple of different ways. The most immediate way is inside Spikemark, through the Log Viewer. This can be opened by clicking on **Window** in the Menu Bar, and selecting Log Viewer. A keen eye can use the Log Viewer to identify potential issues or errors that Spikemark might be encountering, and to monitor Spikemark processes in real time.

In addition to having a live Activity Log, Spikemark creates Log Files when closing that save the same information, but in a simple text (.log) file format. The easiest way to find these files is from Spikemark - navigate to the HELP menu and select REVEAL LOG to open a File Explorer window. These files can be opened using any basic text editor, Excel or with our online viewer application:

<https://creativeconners.com/logviewer.html>.

HOT KEYS

As you continue to use Spikemark, you'll find that using Hot Keys can significantly improve your programming efficiency, and hopefully decrease the amount of time spent staring at your computer. We've gone through several Hot Keys in previous sections, but here is a complete list.

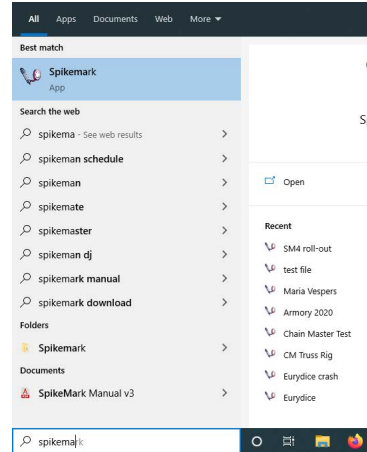
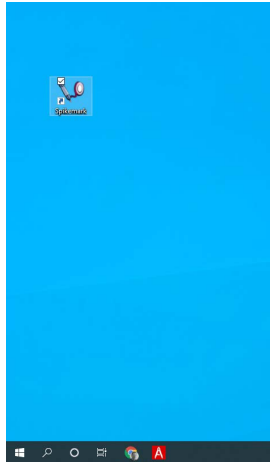
System Functions	
<i>Hot Key</i>	<i>Function</i>
Ctrl+N	New Show File
Ctrl+Shift+N	New From Show
Ctrl+O	Open existing file
Ctrl+S	Save the current file
Ctrl+P	Print
Alt+F4	Exit
Stagehands	
<i>Hot Key</i>	<i>Function</i>
Ctrl+M	Add Stagehand
Ctrl+F	Add Stagehand FX
Ctrl+T	Connect to Stagehand
Ctrl+Shift+T	Connect to all
Cues	
<i>Hot Key</i>	<i>Function</i>
Ctrl+U	Add Cue
Ctrl+D	Duplicate Cue
Ctrl+Shift+U	Remove Cue
Ctrl+R	Restore Cue

Presets	
<i>Hot Key</i>	<i>Function</i>
Alt+P	Create Preset
Cue Control	
<i>Hot Key</i>	<i>Function</i>
Ctrl+F4	Unload current cue
F4	Jump To Cue
F3	Next Cue
F2	Previous Cue
F5	Run Cue
F6	Soft Stop
Misc	
<i>Hot Key</i>	<i>Function</i>
F10	Add log entry

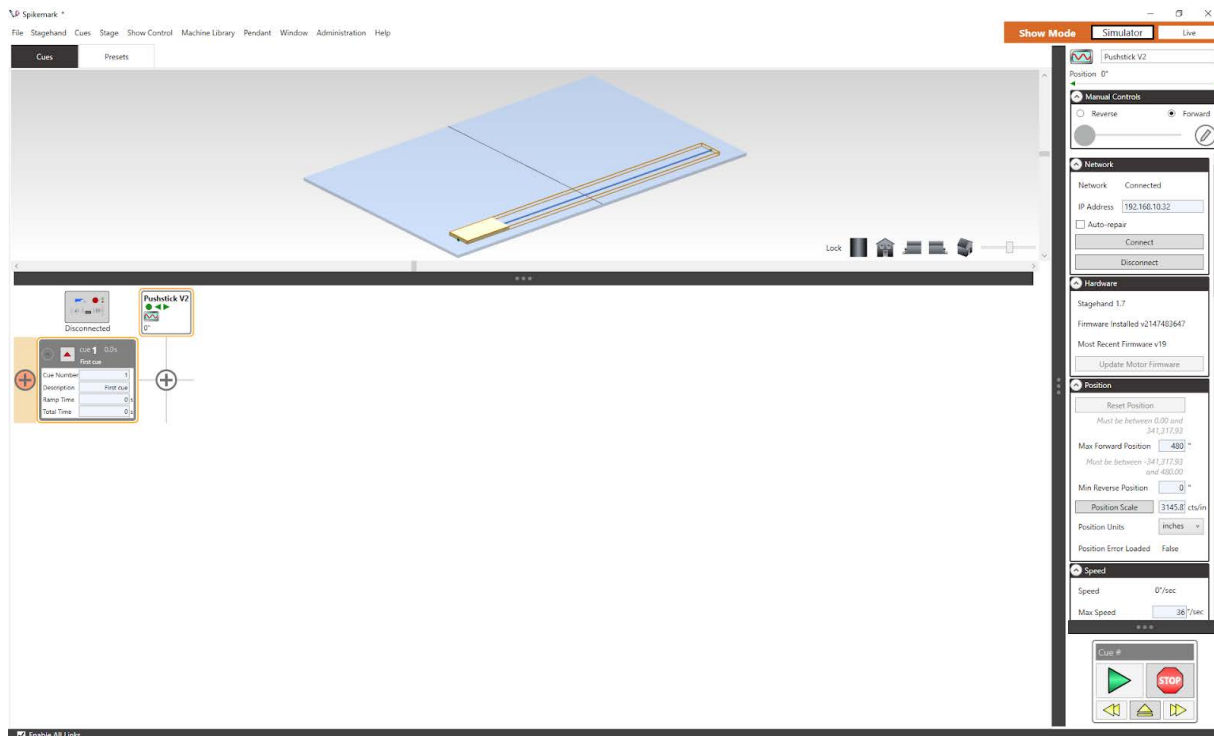
QUICKSTART IN THE SIMULATOR

Spikemark can be run in Simulator or Live mode. As the names suggest, Simulator allows you to program cues and check out movements in the Stage Model Viewer without moving real machines. Cues can be run from the on screen controls or from a Showstopper 3 Consolette.

Let's start by opening Spikemark by double-clicking on the Desktop shortcut, or from the Start menu:



Spikemark will open with the default show file, you should see something similar to this:



Before we jump into writing a cue, let's take a look at how to manipulate the Stage Model view.

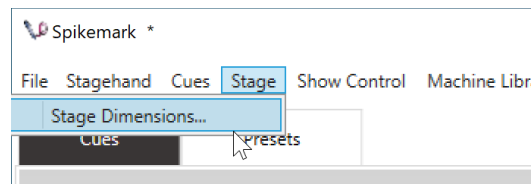
STAGE MODEL VIEWER

The Stage Model Viewer is at the top of the Spikemark screen, you should see a large blue rectangle with a small white rectangle on top of it. This is the Pushstick V2 motor represented on the Stage. All dimensions associated with the Stage Model are in decimal feet.

Let's take a look at how you can manipulate the Stage Model.

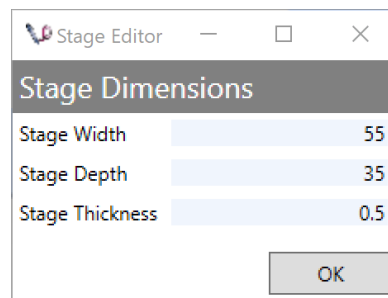
ADJUSTING THE STAGE SIZE

The virtual stage has default dimensions of 55' x 35' x 6". Those dimensions can be adjusted by selecting Stage Dimensions from the Stage menu.



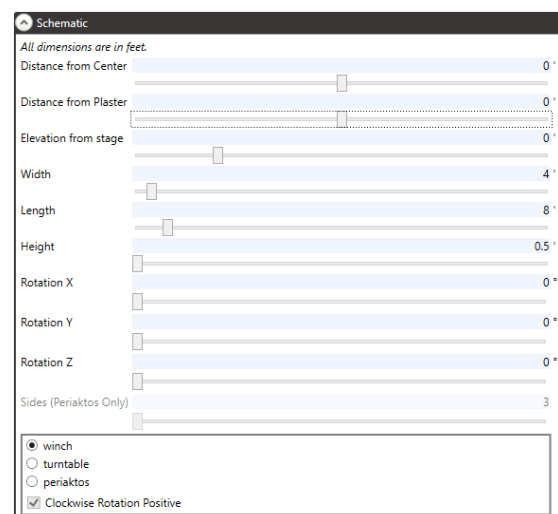
Dimensions for your stage are entered in feet.

Click OK once your dimensions are entered.



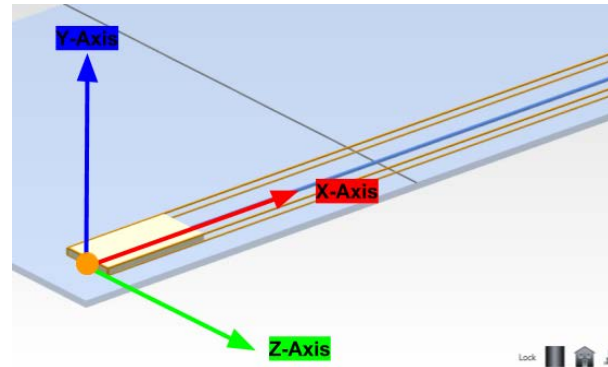
ADJUSTING THE STAGE MODEL

Each motor you add can be easily modified to better reflect the size and shape of your scenery. With the Pushstick V2 selected, scroll down to the Schematic section of the Stagehand Properties panel located on the right of the screen.



By default, the Stage Model Viewer looks at the stage from House Left, so the Stage Right, Plaster Line corner is the closest point to your view. All of these variables reference a Zero Point which is by default at the bottom surface, and center of the Stage Right side of the unit.

We can best identify these points using X, Y, Z axes as references.

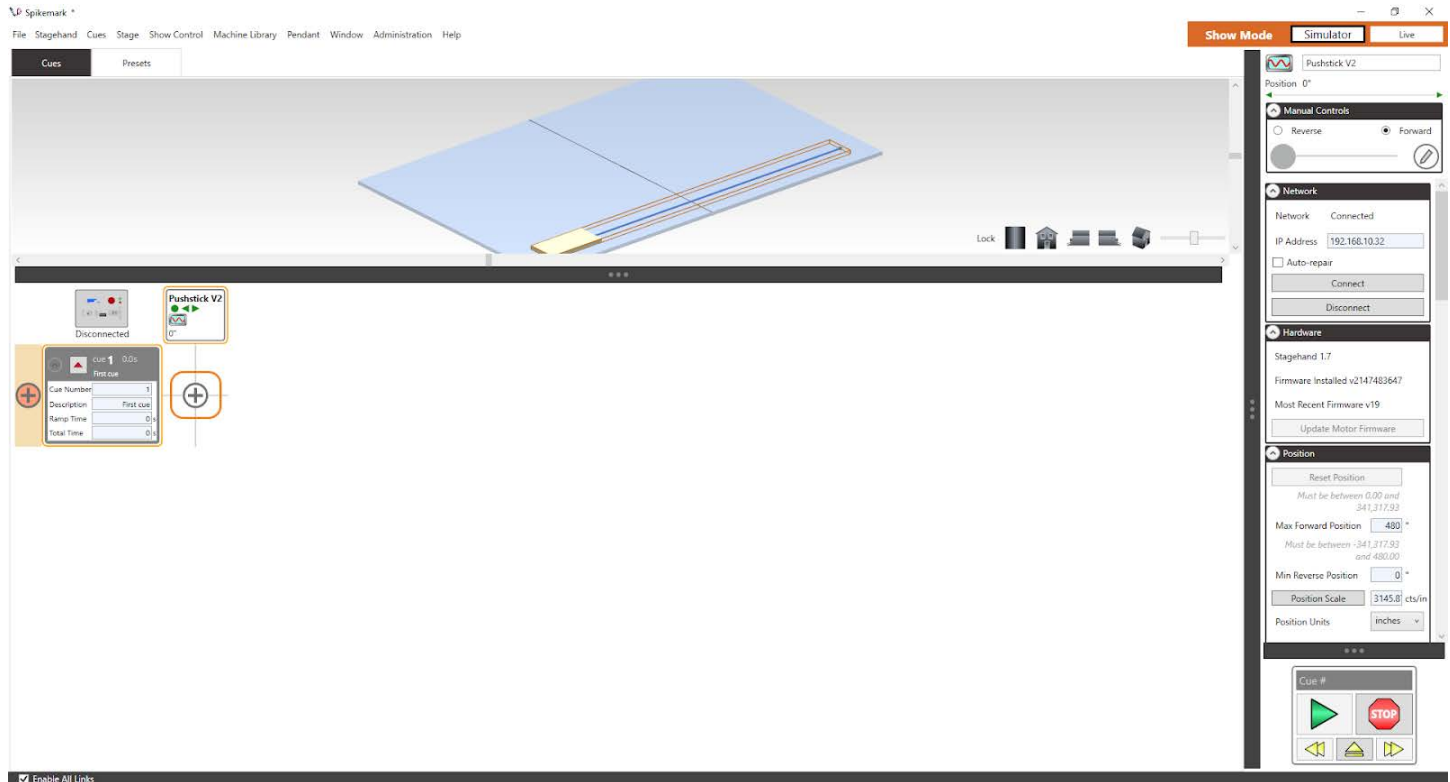


- **X-Axis** - Is a horizontal line running Stage Right to Stage Left.
- **Y-Axis** - Is a vertical line running Up and Down.
- **Z-Axis** - Is a horizontal line running Up Stage to Down Stage.
- **Zero Point** - The orange dot represents the Zero Point of our unit where all schematic dimensions are measured. Note that it is on the bottom surface, and at the center of the Stage Right side.

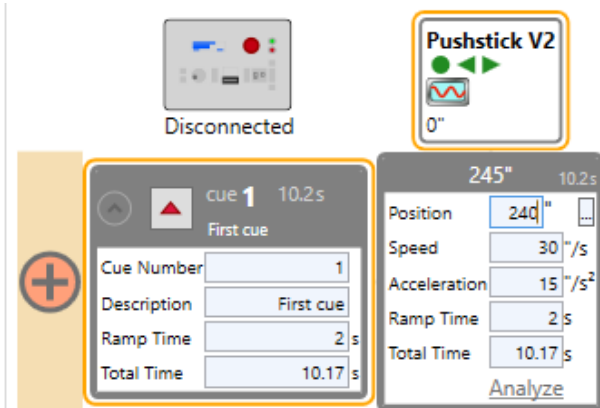
WRITING YOUR FIRST CUE

Now that you have the basics of the Stage Model Viewer under your belt, let's jump in to writing a cue and moving machine in Simulator mode.

1. Launch Spikemark from either the Desktop shortcut or the Start Menu.
2. Confirm that the Simulator mode button is pressed in the top right corner of the screen.
E-STOP NOTE: While it is not necessary to engage the E-Stop when switching to Simulator mode, it is best practice.
3. When Spikemark first opens, the show will contain one wagon named *Pushstick V2* that is placed downstage by default, and a single cue. We can change the name and position of this wagon (or remove it completely), but for now, let's just leave it here.
 - a. If your Pushstick was moved around in the previous exercise just close Spikemark and reopen it to restore the default show file.
4. To add a movement in Cue 1, click on the "+" button at the intersection of Pushstick v2 and Cue 1.

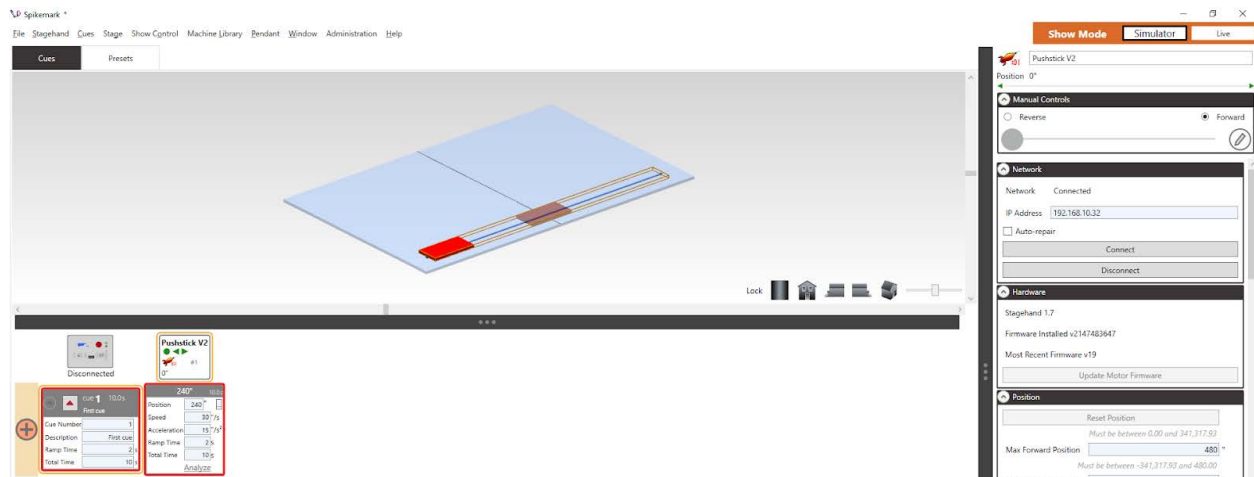
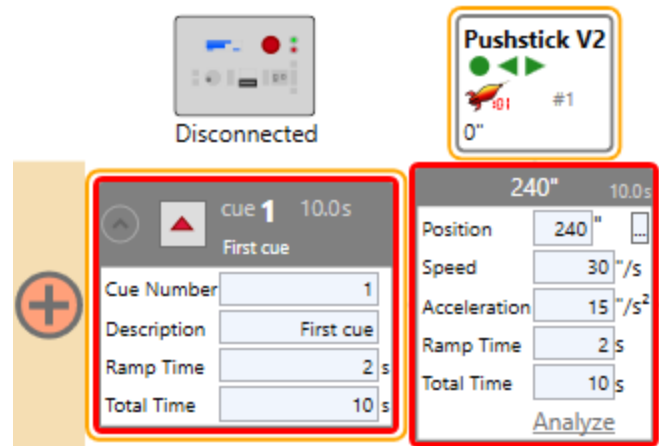


5. A Movement panel will appear with input fields for adjusting the speed and position of the motor that is moving the wagon. For this example, we will enter “240” in the **Position** field to adjust the position of the motor in Cue 1.

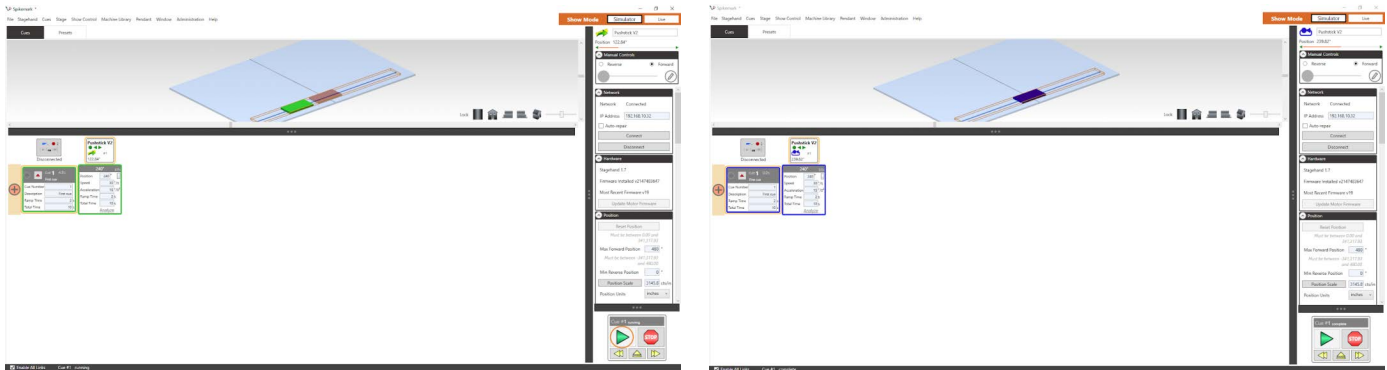


6. Before a cue will run, you will need to load the cue first. Simply, press the **Load** button (the red upward facing triangle) in the Cue 1 panel. There are several immediate changes in the interface to indicate that a cue is loaded.

- Cue 1 and its Movements are decorated with a red border.
- The Pushstick v2 panel shows a rocket icon with a countdown timer, indicating that it is ready to launch. The rocket icon can also be seen at the top of the Stagehand Properties Panel.
- The Pushstick v2 wagon in the Stage Model Viewer turns red showing its current position and displays a semi-transparent area where the wagon will end the cue.



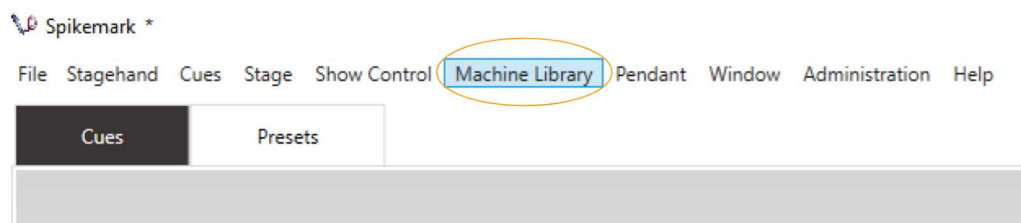
7. Press the **Run** button (the green left facing triangle), the hotkey F5 or the GO button on the Consolette to watch the Pushstick v2 wagon move across the stage. It turns green while running and then blue when it completes the cue. That's it, you wrote your first automation cue!



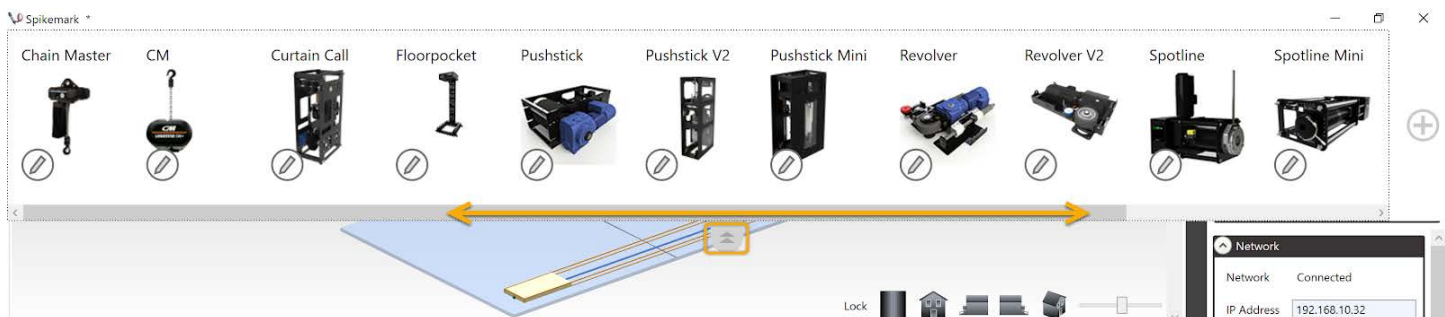
ADDING A SECOND MACHINE TO YOUR SHOW

Now that you see how easy it is to move some scenery around, you probably want to add more to the show. In this section, we are going to add a turntable using our pre-configured [Revolver v2 machine](#).

1. The easiest way to add another axis to a show is to use Spikemark's **Machine Library**. Click on the Machine Library menu.

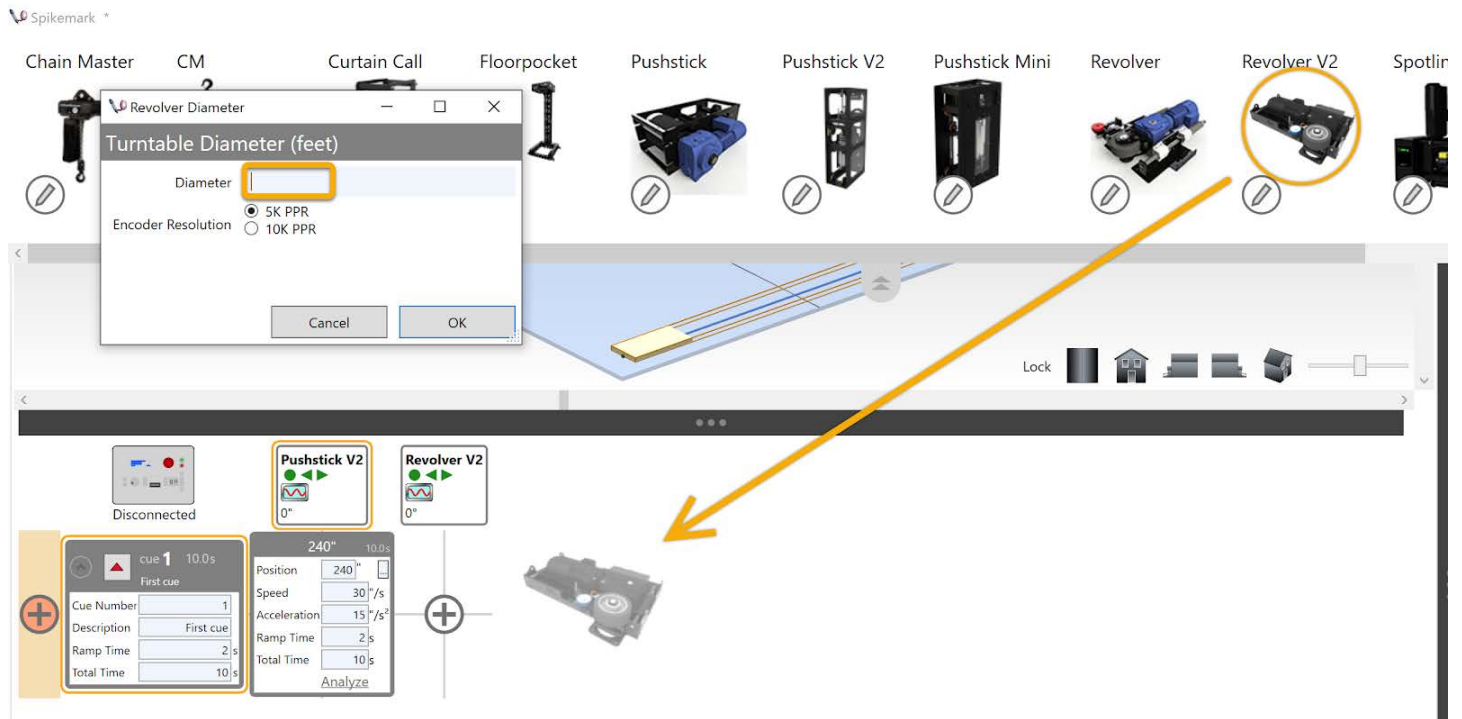


2. The Machine Library slides down into view, and is pre-loaded with all the stock machinery from Creative Conners, Inc:

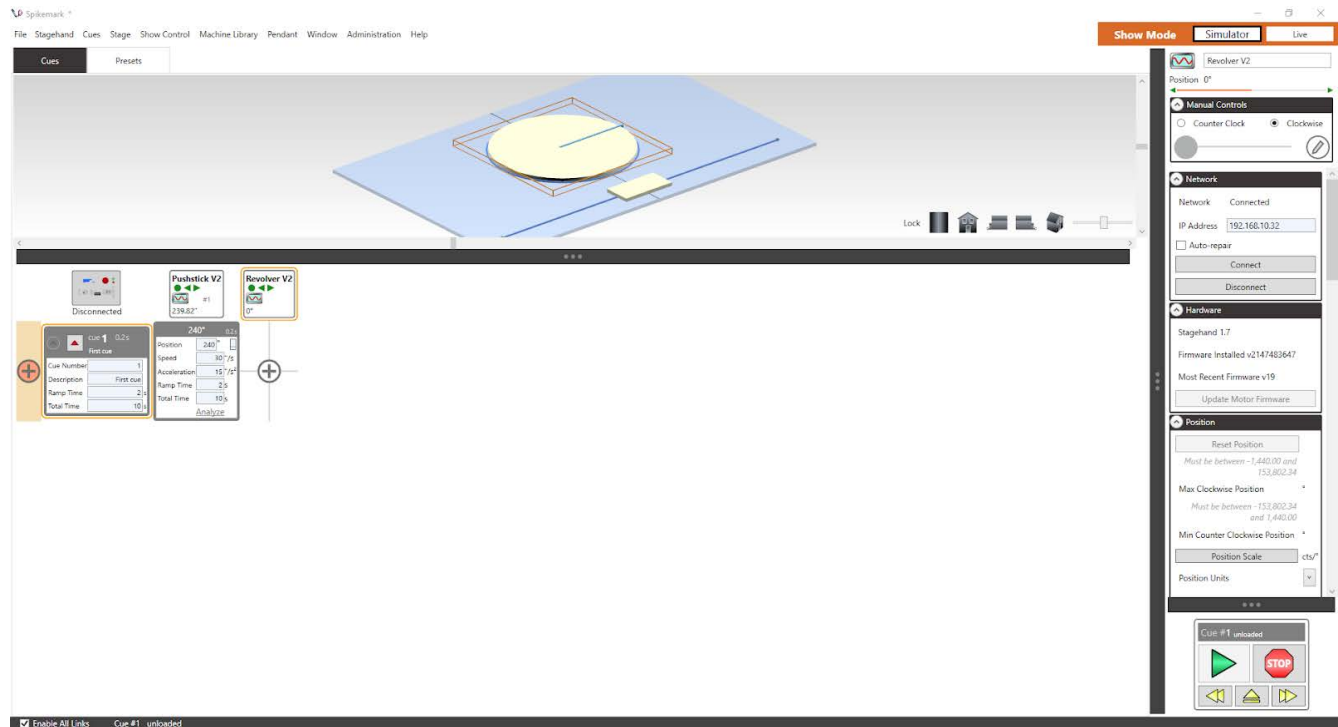


- a. Click on the double chevron to close the Machine Library
- b. Use the Horizontal Scroll Bar to see additional machines in the Library

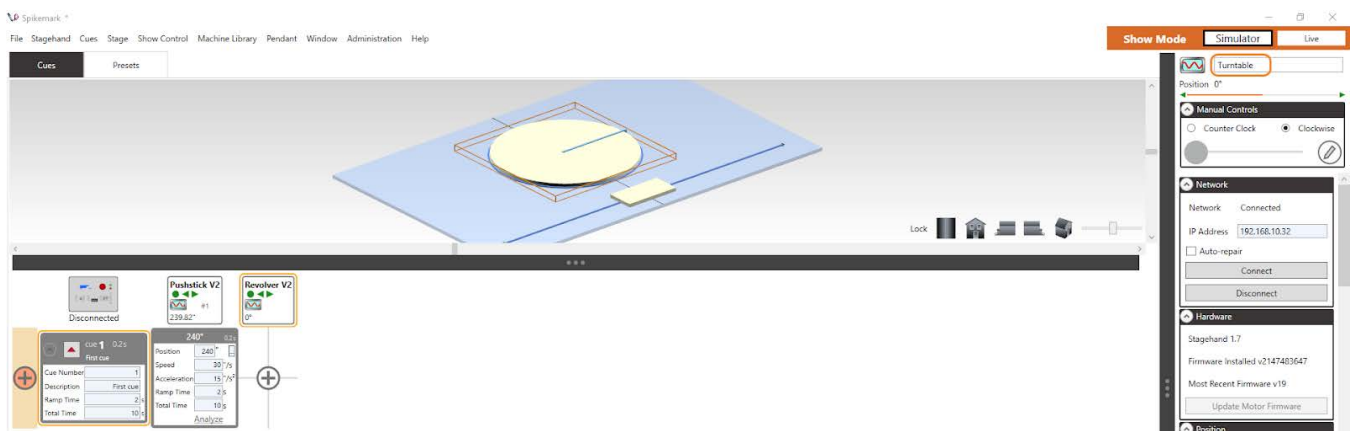
3. We are going to add a turntable to our show. Simply drag a Revolver v2 from the **Machine Library** and drop it either on the Stage Model Viewer or the **Cue Grid**, either works fine.



4. When you drop the Revolver into the show, the 'Revolver Diameter' dialog box is displayed. Enter in a diameter of 20 (for twenty feet) and press OK. You will also be prompted to select 5K PPR or 10KPPR. This just tells Spikemark how to calculate Positions Scale, but since we don't have an actual machine connected, feel free to select whichever you please.
5. We are finished with the Machine Library for now, so click the **Close Tab** (two chevrons at the bottom center of the Machine Library drop down, or press **Escape**) to roll it up and out of the way.
6. You can see that a 20' diameter turntable has been placed on the centerline of the stage and a little bit upstage of the Pushstick v2 wagon.



Before we move on to the next section and write some more cues, let's take a second to rename our new turntable. Rather than use the name Revolver v2, let's label it Turntable. Click on the name in the **Stagehand Properties Panel** and change the name to Turntable and then press the Tab key to finish editing. You'll see that the name updates in the Cue Grid to read Turntable.

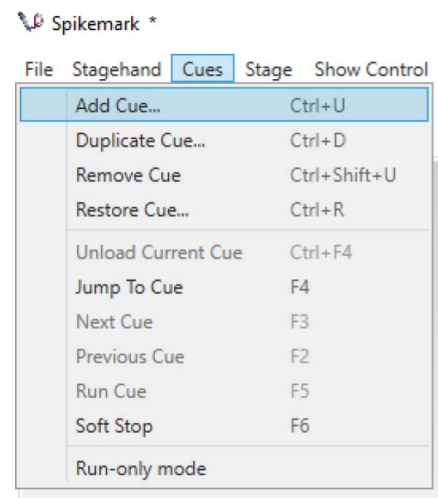


WRITING CUES WITH MULTIPLE MACHINES

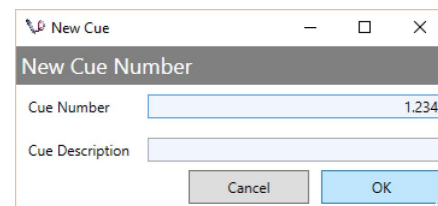
Writing cues with two or more machines is just as easy as writing cues with a single machine. The following steps will guide you through the process, and along the way you will learn a couple of other handy features in Spikemark.

1. Let's add another cue to our simple show. From the **Cues** menu, select 'Add Cue...'

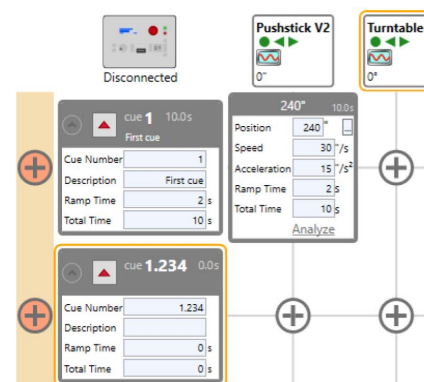
(Note: You can also add a cue with the hotkey combination of Ctrl-U or by right clicking in the cue grid and selecting Add Cue from the menu.)



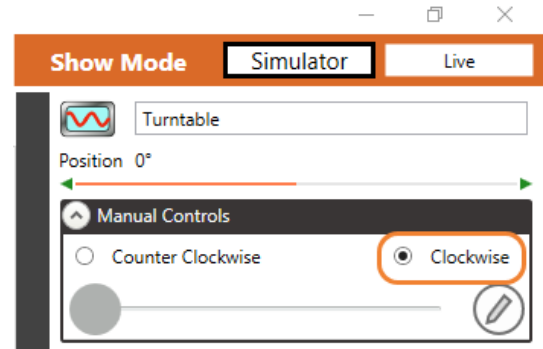
2. The New Cue dialog appears and suggests a Cue Number of 2, since that is the next highest whole number for a cue. Even though it was nice of Spikemark to offer a suggestion, let's type in "1.234" for a cue number and then press OK.



3. A new row is added to the Cue Grid for Cue 1.234.

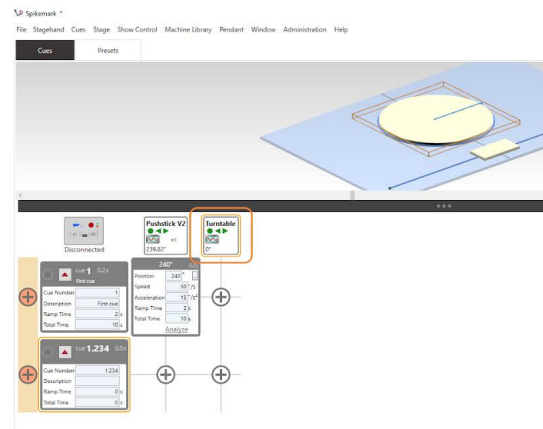


- Before we add the Turntable into Cue 1.234, let's manually run it into the position that we wish to record in the cue so we can set the position visually. Select the Turntable either by clicking on it in the **Cue Grid** or the **Stage Model Viewer**.

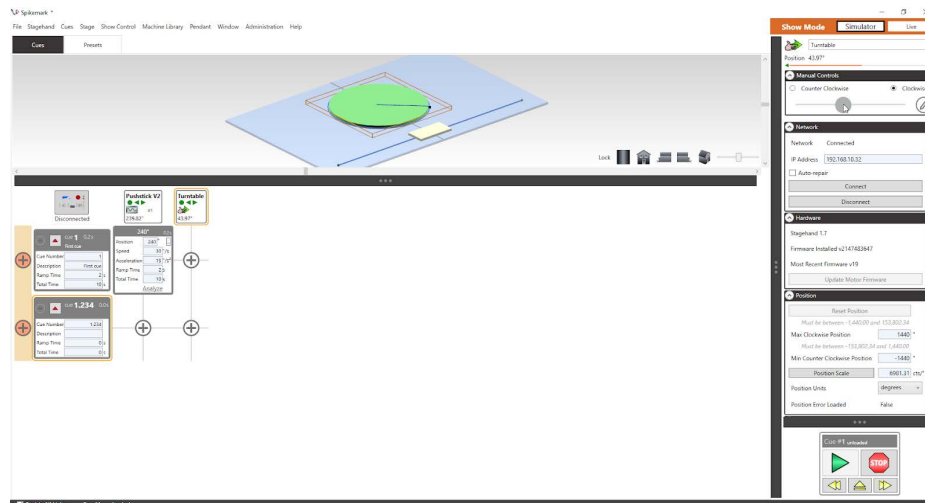


- When a machine is selected, it will have an orange border around it in the Cue Grid and the Stage Model Viewer. Once selected, that machine's properties will be displayed in the Stagehand Properties Panel on the right side of the screen.

With the Turntable selected, we are going to run it clockwise until the blue index mark is pointing downstage. Click on the Clockwise radial button in the **Manual Controls** section of the **Stagehand Properties Panel**.



- Click and drag the Speed Slider in the Manual Controls section of the Stagehand Properties Panel. You will see the Turntable start moving in the Stage Model Viewer and the Position numbers start to increase in both the Stagehand Properties Panel and the Cue Grid.



- When the Turntable is pointed downstage with a Position of roughly 90 degrees, lower the speed slider back down and release it to stop the Turntable. (If you really want to be precise, right click

on the Turntable header, select “Move to Position” and use the pop up window to go 90 degrees.)

8. With the Turntable in a position we want to record, add a Turntable movement to Cue 1.234 by clicking on the “+” button at the intersection of Turntable and Cue 1.234. Notice that Spikemark records the current position of the Turntable as the target position for the movement. This makes it easy to position all your scenery on stage manually, and then record the scene as a cue. You are free to change the Position anytime, but for now let’s just leave it.
9. Let’s add another cue. From the Cue menu, select ‘Add Cue...’
Enter “2” for a Cue Number.
10. In Cue 2, we want both the Pushstick and the Turntable to move so click the “+” buttons for both movements in Cue 2.
11. Enter a Position value of 0 for the Pushstick v2.
12. Enter a Position value of 0 for the Turntable.
13. Rather than adjust the Speed and Acceleration values, let’s have Spikemark do the math to figure out how fast to move both machines if we want the cue to last 11 seconds. Enter “2” into the Ramp Time field and “11” into the Total Time field of Cue 2.

NOTE: Speed values are given in units/sec. For instance the Pushstick V2 defaults to inches (inches/sec) and the Revolver defaults to degrees (degrees/sec). Acceleration values are always given in units/sec/sec (e.g. degrees/second/second). Ramp Time and Total Time values are given in seconds.

You can fill in either set of values for a cue or movement, but not both Speed/Acceleration and Ramp Time/Total Time.

To illustrate the point, imagine requesting a pilot to fly a plane from New York to Los Angeles in 1 hour at a speed of 60mph. Only one of those requests can be honored because of the laws of physics. You can request travel duration, or a speed, but not both.

1. Press the **Load** button in the Cue 2 panel.
2. Press the **Run** button and watch the cue execute. Notice how both the Pushstick v2 and the Turntable start and end at the same time since we specified a Total Time for the entire cue.

USING SPIKES

So far we've been typing in position values for each movement. That is a valid technique, but using **Spikes** to define positions offers some valuable benefits.

Traditionally, when you need to push scenery out on stage during a scene change you stick a piece of spike tape on the floor so you know when the scenery is at the proper position. You grab a marker and label the spike tape with a useful name like "Act II Parlor". Bits of tape on the floor end up being a much more practical way of placing scenery at the correct spot on stage rather than keeping a pocket notebook of measurements and running out with a tape measure during every scene shift. Besides avoiding the obvious embarrassment of standing on stage with a tape measure scratching your head, it also makes changing the position simpler. If you have to change a position during tech rehearsal, you lift the tape and move it instead of searching through a notebook and finding all the places in the show where you need to adjust the measurement.

Spikes behave like virtual spike tape inside Spikemark. You can set positions and label them. You can program scenery to move to those positions in every cue that shares the spike. If you find that you need to change the spike position during rehearsal, just edit the value in one place and all of the cues are automatically updated with the new position.

If we think about the positions we've used so far in our tiny show, each motor has two positions that we could turn into spikes.

Pushstick v2:

- Offstage = 0"
- Center stage = 240"

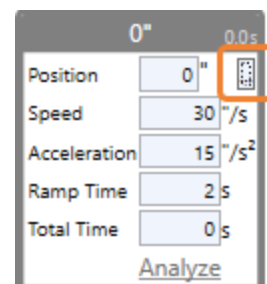
Turntable:

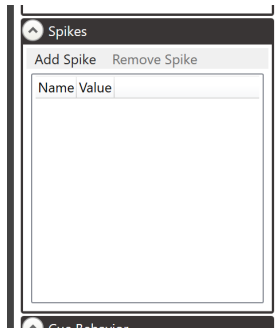
- Pointing stage left = 0 degrees
- Pointing downstage = 90 degrees

CREATE SPIKES FOR THE PUSHSTICK

There are two ways to create and edit Spikes:

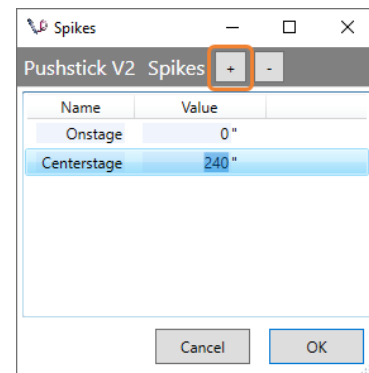
Click on the "..." button next to the Position field in the Pushstick v2 Movement panel for Cue 1.



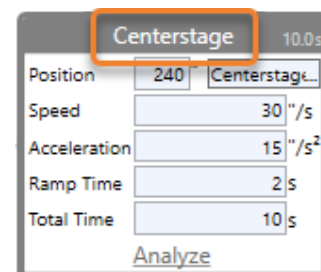


With the axis selected, scroll down the Stagehand Properties panel until you find the Spikes section.

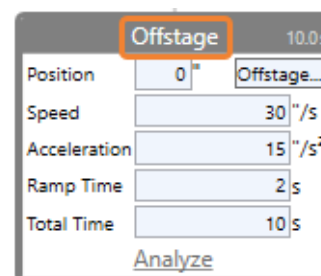
1. Clicking on the “...” will display the Spikes window. Add two spikes to the *Pushstick v2* by clicking the “+” button twice. Add the Values shown
2. Select the Center Stage spike to use it in Cue 1.
3. Press OK.



4. Notice that the Pushstick Movement for Cue 1 shows the Center Stage Spike name for the target position.



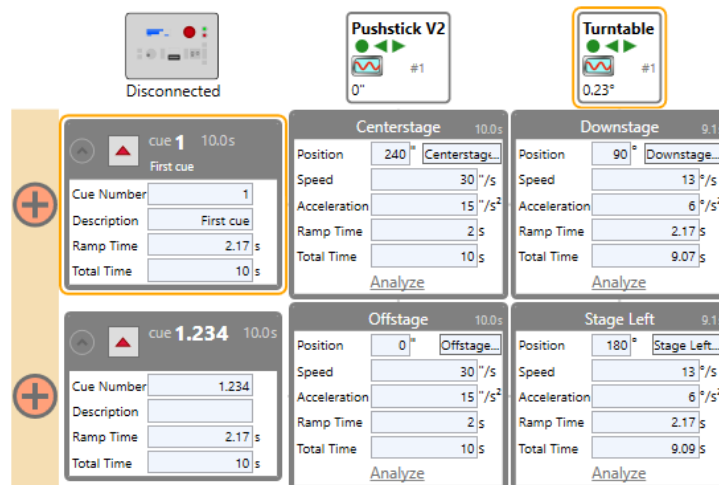
5. Similar to the same steps as above: In the Pushstick v2 Movement panel for Cue 2, click the “...” button next to the Position field.
6. Select the Offstage spike.
7. Press OK.
8. Notice that the Pushstick v2 Movement for Cue 2 shows the Offstage Spike name for the target position.



TO CREATE SPIKES FOR THE TURNTABLE:

Follow the same steps used above that we used for the Pushstick v2, but now for the Turntable:

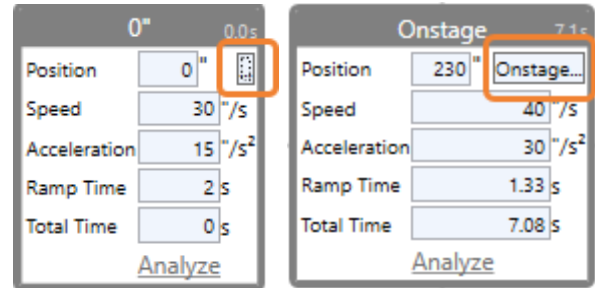
1. Click on the “...” button next to the **Position** field in the Turntable Movement panel for Cue 1.234.
2. The Spikes window will appear. Add two spikes to the Turntable by clicking the “+” button twice.
3. Enter in the Names and Values as shown below.
4. Select the Downstage spike to use it in Cue 1.234.
5. Press OK.
6. Notice that the Turntable Movement for Cue 1.234 shows the Downstage Spike name for the target position.
7. In the Turntable Cue 2 Movement, click the “...” button next to the Position field.
8. Select the Stage Left spike.
9. Press OK.
10. Notice that the Turntable Movement for Cue 2 shows the Stage Left Spike name for the target position.



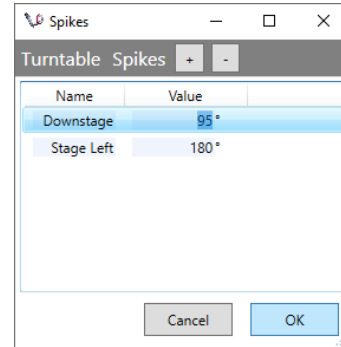
ADJUSTING SPIKES

With the spikes defined, let's take a look at how easy it is to adjust a spike position.

1. Press the “...” button next to the **Position** field for either of the Turntable’s Movements.
(Note: If you are adjusting from a movement with an existing spike, the “...” button will be the spike’s name i.e “Onstage...”).



2. Change the value for the Downstage spike to 95.
3. Press OK.
4. Notice that the position for the Turntable in Cue 1.234 has been updated to reflect the new Spike value. If we had multiple cues referencing the Downstage Spike, all of them would be updated automatically.



NOTE:

A handy way to pre-program cues for a show is:

- Write spikes for all the cue positions of each scenic element in a script.
- Assign approximate positions for each spike, but don't worry too much about accuracy.
- Write cues in the Simulator and go over the rough cues with Stage Management.
- During load-in, run each motor to the correct positions on stage and adjust the values for each spike to match the correct physical position.

All of your cues that are already written will be updated with accurate positions and you'll head into tech with a great starting point for your show.

MOVING REAL MACHINERY WITH SPIKEMARK

We discussed adding machines to Spikemark and setting them up to run in Simulator mode. Let's dive into the additional setup required to *Make It Move!* in the real world.

SETTING UP PHYSICAL CONNECTIONS

Before anything will work, all of your cables will need to be properly connected. No matter what type of Stagehand you are controlling - and there are loads to choose from - they each require the following connections:

- Input power
- E-Stop
- Network (Ethernet)

In addition to the above, all stand-alone Stagehand controllers also need to be connected to the machine they are controlling with the following:

- Motor output
- Brake(s) output
- Sensors
 - Encoders and hard limits

Input power requirements vary dramatically based on the controller specifications. This can range from 120VAC single phase, or 220VAC single phase, though the most common input power is 208VAC three phase. Each Stagehand controller is clearly labeled with its ratings. If your controller doesn't have a label or if you have any questions do not hesitate to reach out to support@creativeconners.com.

The E-Stop input is a 24VDC signal supplied by the Showstopper 3 system. Depending on the controller, this 24VDC signal could be directly operating relays or contactors, but in more modern Stagehands this signal is giving the OK to a safety relay. Either way, the Stagehand requires this 24VDC signal before it will be able to operate a motor.

The network connection is what allows Spikemark to communicate with the Stagehand. This connection is not required to power on the Stagehand Controller, only to control it from Spikemark.

In order to make a motor spin, it needs to be connected to the Stagehand Controller. In addition to sending voltage to the motor, we also need to release the brakes. Legacy Stagehands utilized separate cables for motor and brakes, the motor and brake connections on modern Stagehands are combined into a single cable.

The final connections we need are the sensors. These typically include hard limits and encoders. On legacy Stagehands there is a cable per sensor, while late model Stagehands combine any sensor signals into a single cable.

If you are running a Smart Machine such as the Spotline Mini, you will only see the three input connections.

SETTING UP A NETWORK CONNECTION (IN WINDOWS 10)

Once everything is plugged in we need to test that the connections work. We'll start by confirming that the Ethernet connection is functional. Spikemark and the Stagehands communicate through IP Addresses and unlike your WiFi, these are Static IP Addresses. This means we need to assign a specific and unique IP Address to any network device, including the PC running Spikemark in order to allow communication between the devices.

Much like a postman delivering letters to homes with address numbers nailed to the mailbox, Spikemark sends its commands to Stagehands with unique address numbers.

IP addresses are made up of four segments (Octets, if you want to impress friends) separated by a period (for example, "192.168.10.20"). The only trick to setting up a static IP network with Spikemark and Stagehands is that the first three segments should always match. The last segment number needs to be unique.



IP ADDRESS GUIDELINES

Each device on the automation network requires a unique static IP Address in order to communicate. These IP Addresses need to be set on each device and in Spikemark. Unless you are digging deep into subnets, or have changed the default IP range, each device on the network must have an IP Address between 192.168.10.001 and 192.168.10.254. In practice we have found network stability to become shaky when setting the computer or Stagehand IP Address below .010.

Additionally, if you're setting any IP address below .100 (i.e. 1 through 99), do not use a leading 0. This will undoubtedly make any networking geek cringe, but an IP Address .001 will be entered at ".1", an IP Address of .010 will be entered as ".10" so that Spikemark will connect the address correctly.

Below are a list of recommended default IP Addresses:

Spikemark PC	192.168.10.245
Showstopper 3 Consolette	192.168.10.254
Spikemark Pendant	192.168.10.250

Stagehand Controller 192.168.10.10 thru 192.168.10.240

The above addresses are only suggestions and can be adjusted as needed. In reality, the IP address can be any available number in the 192.168.10.xxx range. Limiting the Stagehand IP's between .10 and .240 helps reduce the potential for IP Address conflicts.

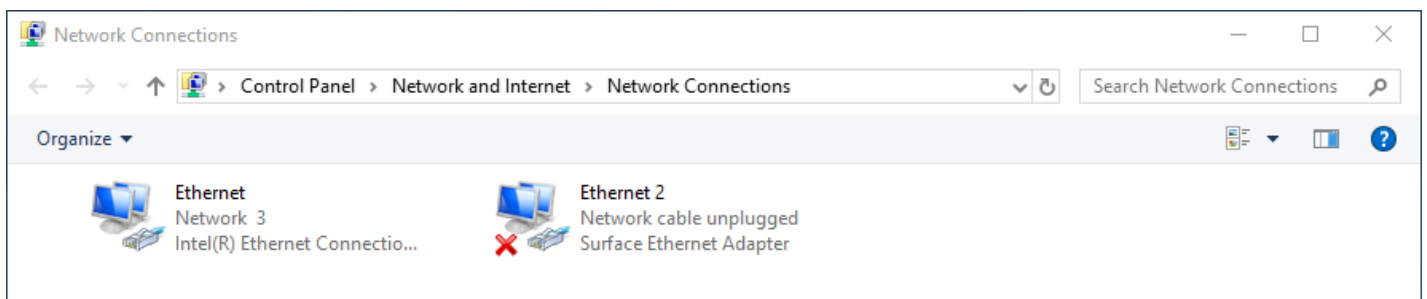
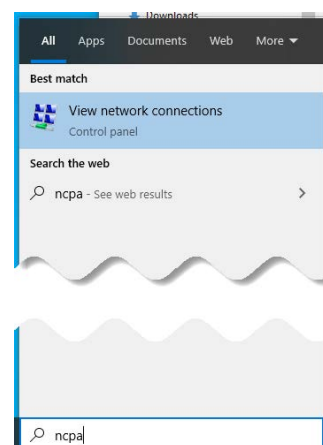
SETTING THE IP ADDRESS OF YOUR COMPUTER

Before diving into IP addresses, confirm the computer is physically connected to the network switch with an Ethernet cable, and verify that the switch is also plugged in and powered on.

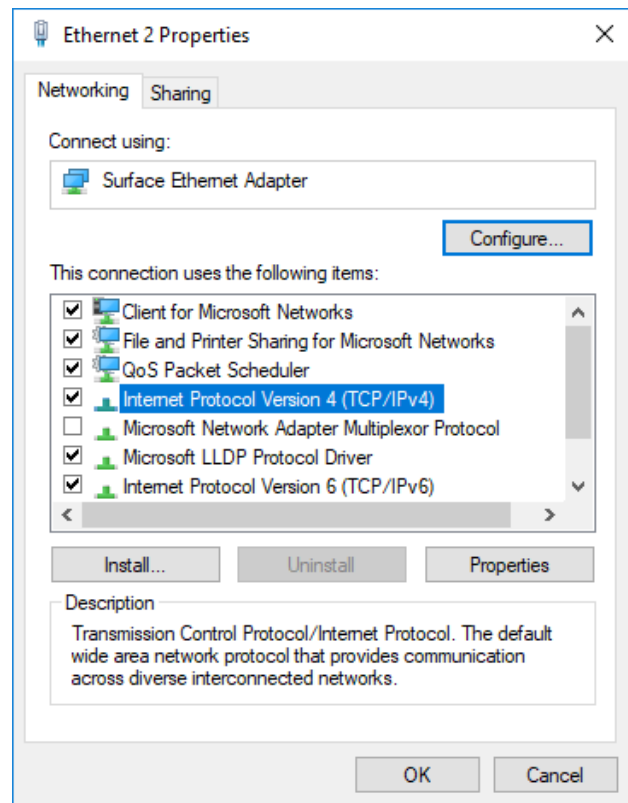
1. The easiest method to navigate to the Network Connections window is by pressing the Windows Key and entering 'ncpa' and selecting "View Network Connections".

This will open the Network Connections window (below).

2. Right click on your network connection (*in the example below, we are using Ethernet 2*) and then click "properties" to open the properties windows.



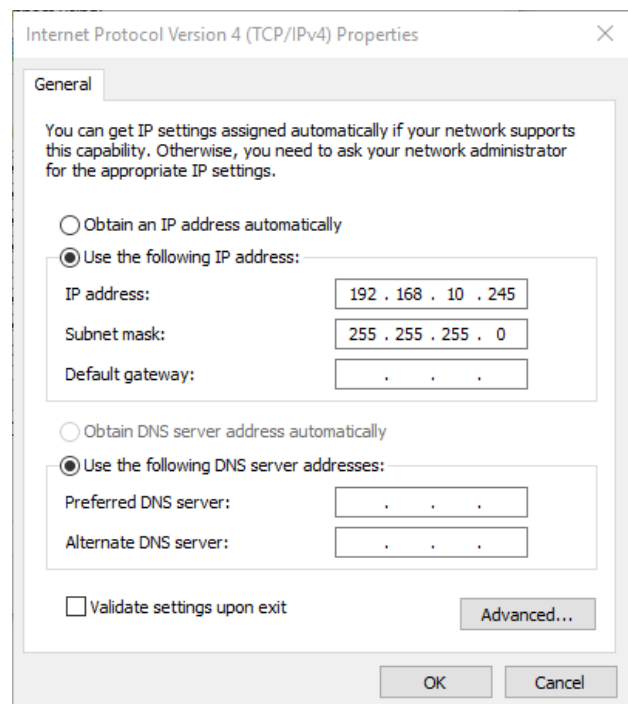
3. Double click on the Internet Protocol Version 4 (TCP/IPv4) item, this will open the TCP/IPv4 properties window (to the right).



4. (In this example the IP Address is set correctly to 192.168.10.245.) If the 'Obtain an IP Address Automatically' button is selected, you will need to select "Use the following IP Address" button and manually type in the IP Address.

The Subnet mask typically auto-fills to the correct values, but if that doesn't happen, just type in what is shown here. Default gateway, and all DNS server boxes should be left blank.

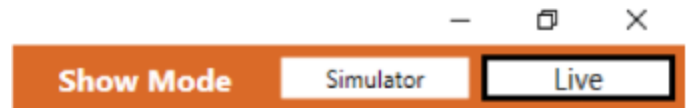
Once the IP Address is set/confirmed, click OK twice to get back to the Network Connections window then close that window. Go back to Spikemark and follow the steps below to connect to your Stagehand in the **Network** section of the **Stagehand Properties Panel**.



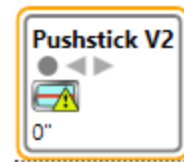
ESTABLISHING A NETWORK CONNECTION TO YOUR MACHINE

With the network address configured on your computer and a machine or two, we're ready to establish a connection to a Stagehand within Spikemark.

1. With Spikemark Open, select **Live** from the **Show Mode** switch.

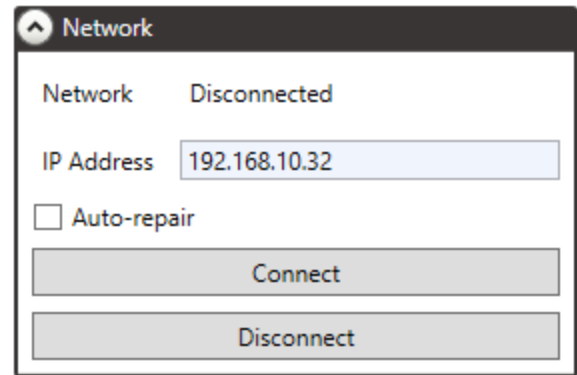


2. Select the motor you wish to connect to by clicking on it in the **Cue Grid**. An orange highlight will appear around the selected motor.



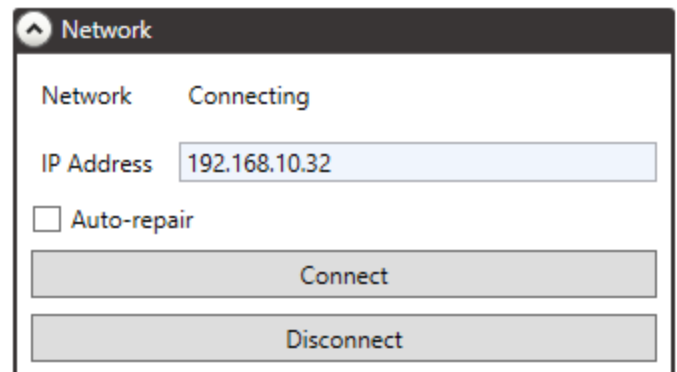
3. In the **Network** section of the **Stagehand Properties Panel** on the right side of the screen, enter the IP Address of your Stagehand Motor and click Connect.

In this step, make sure you copy the IP Address exactly as it appears on the face panel of the Stagehand LCD display.



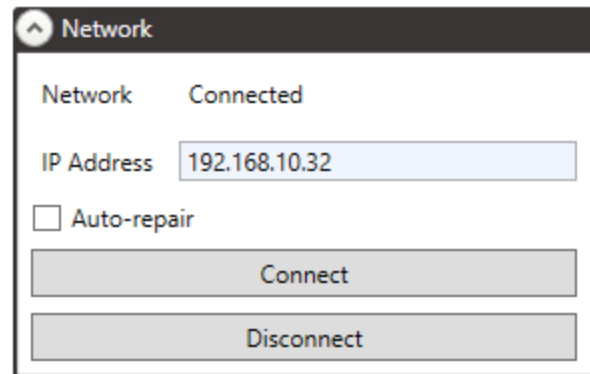
Once the Stagehand IP Address has been verified, click on Connect.

You will see the Network status change to Connecting, and the connection dot on the Stagehand Icon will either flash yellow and grey, or turn solid yellow as it attempts to connect.



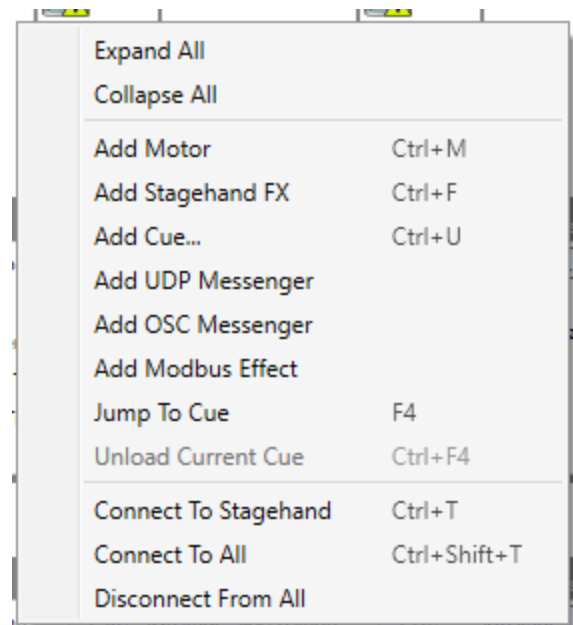
4. The Network status should then change from Disconnected to Connected.

If there's a network error, check your IP settings on the computer and Stagehand and then check your cabling.



You can also connect to or disconnect from all Stagehands at once by right clicking in the white space on the **Cue Grid** and selecting Connect to All or Disconnect From All.

You can also use the hotkey command Ctrl+Shift+T to attempt to connect to all Stagehands at once.



SETTING THE IP ADDRESS AND CONNECTING YOUR ACCESSORIES

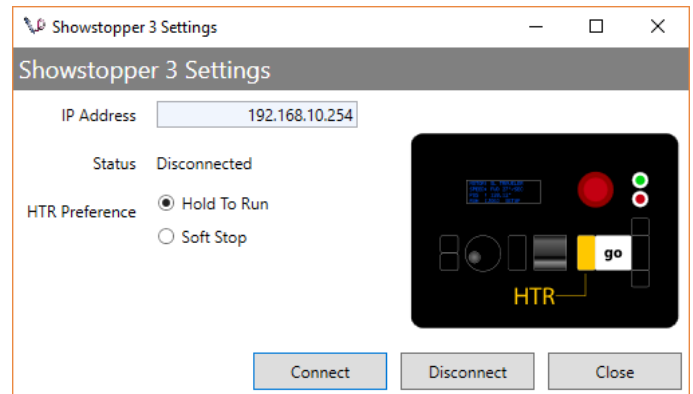
Connecting a Showstopper 3 Consolette or a Spikemark Pendant require a few additional steps.

SHOWSTOPPER 3

1. Click on the Showstopper 3 Consolette (Consolette) Icon in the top left corner of the Cue Grid to open the Showstopper 3 Settings Window.



2. The Consolette will display Disconnected and an IP Address (192.168.10.254). Confirm this IP Address matches in the IP Address on the Consolette and click Connect at the bottom of the window.



3. The Showstopper 3 Settings Window will automatically close, and the Consolette Icon will show that it is connecting.

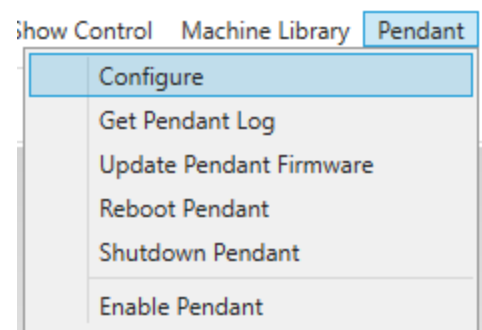


4. Once a connection has been established, the Consolette Icon will turn black and display Connected.



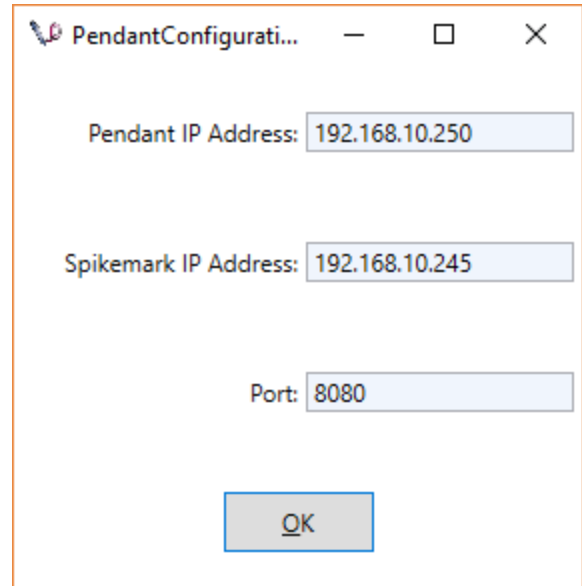
SPIKEMARK PENDANT

1. Click on **Pendant** in the Menu Bar and select Configure to open the Pendant Configuration Window.



2. When the Pendant powers on, the main screen will display the same three input fields seen here. Ensure that the information matches on both the Pendant and Spikemark.

When all information is entered and verified, click OK to close the Pendant Configuration Window.

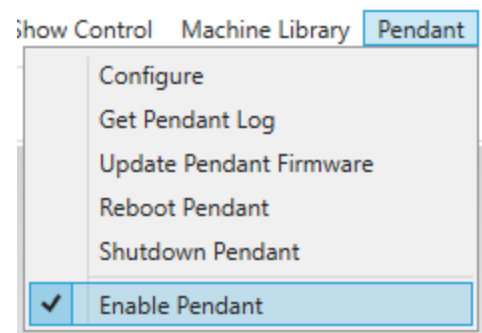


The screenshot shows a window titled "PendantConfigurati...". It contains three input fields: "Pendant IP Address:" with the value "192.168.10.250", "Spikemark IP Address:" with the value "192.168.10.245", and "Port:" with the value "8080". At the bottom is an "OK" button.

3. Click on Pendant in the Menu Bar and select Enable Pendant.

The drop down window will close, but if you click on Pendant in the Menu Bar again, you should see a check mark next to Enable Pendant. This signifies that Spikemark is ready to connect to your Spikemark Pendant controller.

Complete the connection process from the Pendant.



TESTING MANUAL MOVEMENT

Now that you have Spikemark communicating with all the devices, it's time to test the movement.

CONFIRMING ENCODER FEEDBACK

Before we begin writing cues, we need to make sure that the motor moves in the direction that we want it to move. We do this by comparing the actual movement with the encoder feedback. Your Stagehand will need power, e-stop, network and be connected to a machine in order to do this test.

The most direct way to confirm the encoder is counting as expected is by manually jogging the motor from the face of the Stagehand.

1. Confirm the machine is clear and able to move. If you have scenery attached, also confirm the path is clear.
2. Press and hold the FWD jog button on the Stagehand
3. Slowly turn the jog wheel Clockwise.

4. The Stagehand display should display FWD and a xxx%(this is the percentage of speed the Stagehand is sending to your machine) as well as increasing encoder counts.
 - a. If the encoder counts are decreasing, you will need to swap the two phases of the encoder signal.

It is also possible to confirm encoder counts through Spikemark. To do so, add a new machine from the Machine Library. The below example shows us using a Pushstick V2.

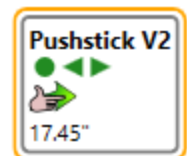
1. Mark the motor's physical position on the stage with a piece of spike tape.
2. With the motor still selected in the Cue Grid, find the **Manual Controls** section of the **Stagehand Properties Panel**.
3. Select the Forward direction.
4. Make sure that there are no obstructions in the motor's path, and slowly start increasing the speed slider.

You have to hold the mouse button down while the motor is moving. If you release the mouse button, the motor will stop. It's a dead-man switch.

5. Confirm that the position number at the top of the Stagehand Properties Panel is increasing as the motor moves forward.



The number is also increasing in the Motor Icon on the Cue Grid. You can also see that the Forward Movement Symbol (hand with green arrow point right) indicates that forward movement is happening.



PRO TIP:

Encoder counts must match the control signal direction. Meaning, when the Stagehand sends a FORWARD speed signal we must see POSITIVE encoder counts, and a REVERSE speed signal must produce NEGATIVE encoder counts. Refer to the Stagehand manual to address this issue prior to running a cue.

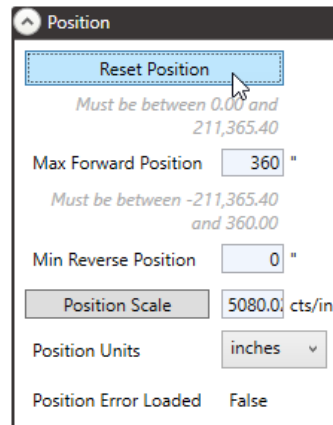
MACHINE PARAMETERS

Before writing any cues we need to set and confirm several machine parameters.

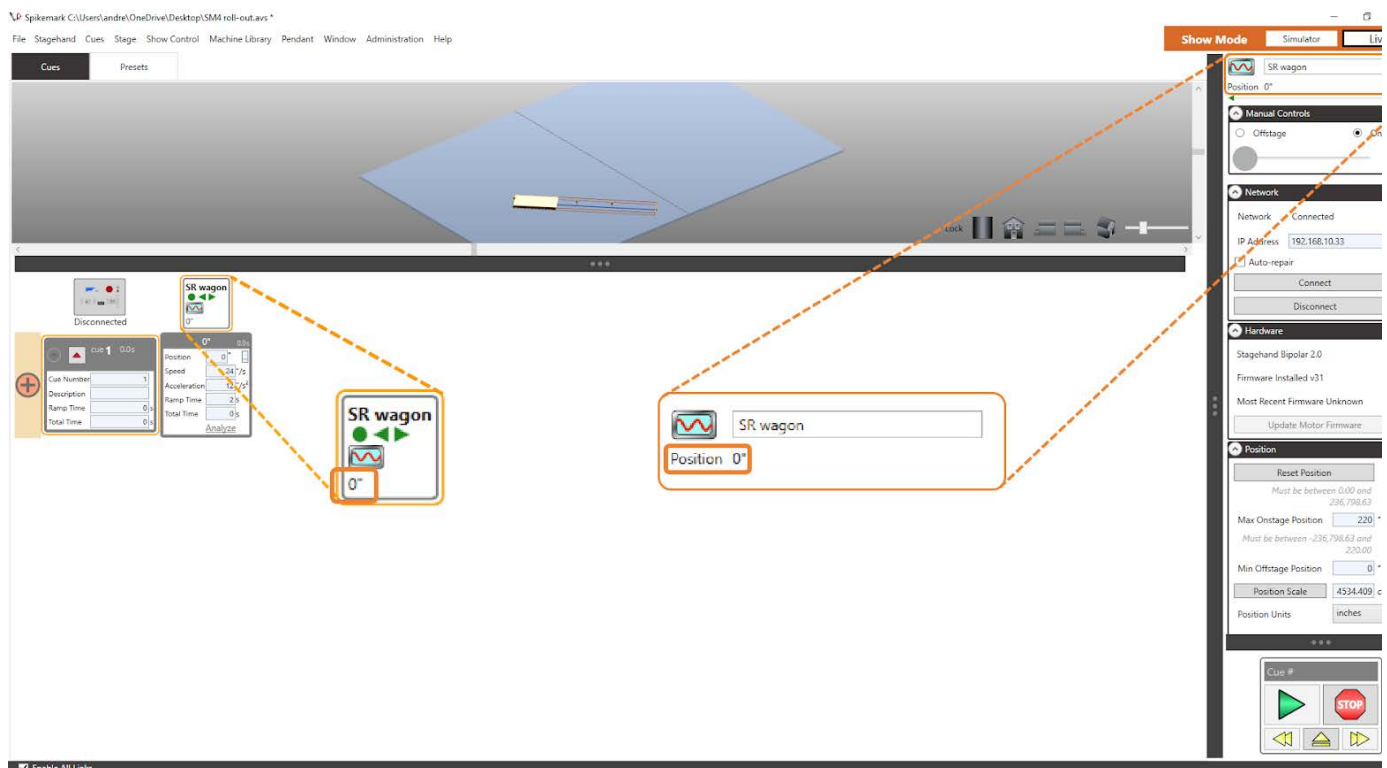
RESET POSITION

Let's begin by setting a home position for the unit. This places the unit on the schematic view and also tells Spikemark where motion begins.

1. Manually jog the unit to its “home” or starting location. This is often the furthest off-stage location, or exactly on center stage for a standard wagon on a deck track.
2. Place matching pieces of spike tape (match marks) on the stage and on the unit. This makes it easy to always come back to this location.
3. In Spikemark, go to the **Position** tab in the **Stagehand Properties Panel** and click Reset Position to open the Position Window.



4. Type in “0” and press OK. You should see the Position at the top of the Stagehand Properties Panel and on the motor icon on the Cue Grid read “0” and the model on the Stage Model Viewer will move back to its home position.



SETTING POSITION SCALE

Once your unit is back at its home location, and Spikemark registers this location as “0”, we can set the Position Scale. Position Scale is the ratio of encoder counts to inches that Spikemark uses to track where a scenic piece is located on stage. Use the following instructions to set your position scale.

1. Measure away from your home match mark on stage a specific distance. Ten feet is usually a good distance for a deck winch or a hoist. At least 180 degrees for a turntable. The larger the distance traveled, the better accuracy you will have. Place another match mark on the floor at this distance. The following instructions will assume you are setting the position scale for a deck winch, however this process is the same for any type of machine.
2. In Spikemark, find the **Position** tab in the **Stagehand Properties Panel** and click on Position Scale to open the Position Scale Wizard.

The screenshot shows the 'Position' dialog box with the 'Position Scale' tab selected. The 'Reset Position' button is at the top. Below it, the 'Max Forward Position' is set to 360 inches, with a note 'Must be between 0.00 and 211,365.40'. The 'Min Reverse Position' is set to 0 inches, with a note 'Must be between -211,365.40 and 360.00'. The 'Position Scale' is set to 5080.02649006623 cts/in. The 'Position Units' are set to 'inches'. The 'Position Error Loaded' checkbox is unchecked.

3. If you forgot to **Reset Position** to 0, you can press the button 'Reset Zero,' and this will set the position and encoder counts to “0”.

The screenshot shows the 'Position Scale' dialog box with the 'Reset Zero' button highlighted. The 'Encoder counts' are 177801. The 'Distance traveled' is set to 10 inches. The 'New position scale' is 5080.02649006623. The 'Reset Zero' button is highlighted, and the 'Use New Scale' button is also visible.

4. With your position set at zero, and your match mark 10' away on the stage floor, manually jog the unit so that it lines up with the 10' match mark.

5. Select your desired unit to be displayed (we default to inches).

Position Scale

Pushstick Mini

Reset counter to zero, manually jog the motor, and enter the distance traveled to calibrate the position scale.

Reset the encoder counter to zero

Encoder counts 177801

Distance traveled inches

New position scale 5080.02649006623

counts
inches
feet
millimeters
degrees
meters

6. Type in the distance travelled. Since we moved our wagon 10 feet, that would be 120 inches. Notice how the New Position Scale is automatically calculated below.

Position Scale

Pushstick Mini

Reset counter to zero, manually jog the motor, and enter the distance traveled to calibrate the position scale.

Reset the encoder counter to zero

Encoder counts 1739323

Distance traveled 120 inches

New position scale 14494.3583333333

7. Click on Use New Scale to close the Position Scale Window. The new Position Scale will be automatically entered into the Position Tab of the Stagehand Properties Panel as cts/in (or whatever unit you decide to use).

Position

Must be between 0.00 and 74,079.98

Max Forward Position 360 "

Must be between -74,079.98 and 360.00

Min Reverse Position 0 "

Position Scale 14494.3583333333 cts/in

Position Units inches

Position Error Loaded False

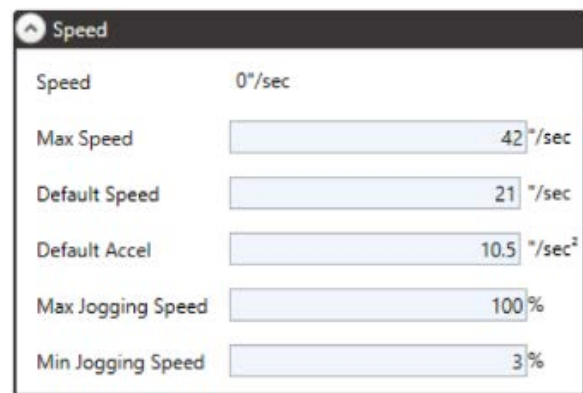
Note: If you are travelling in reverse, the New position scale is a negative number. Spikemark does not accept a negative Position Scale. The way around this is to type in a negative number in the Distance Travelled, starting with the number itself. Type the number in positive, then move the cursor back to the beginning of the number and insert the “-” symbol. You should see the new Position Scale become a positive number, and can then press Use New Scale.

SETTING THE MAX SPEED

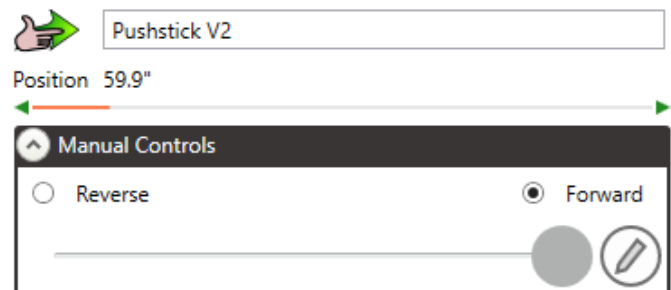
If you're using one of Creative Conners' stock machines, the Max Speed has already been tested and set. However, if you need to change these values, you can. This process can be done by yourself, but it is much easier and safer if you have a second set of eyes.

1. Navigate to the **Speed** section of the **Stagehand Properties Panel**.

At the very top of the Speed section, it shows a Speed value of 0"/Sec (this example shows inches, but whatever unit you used for the Position Scale will also show up here).

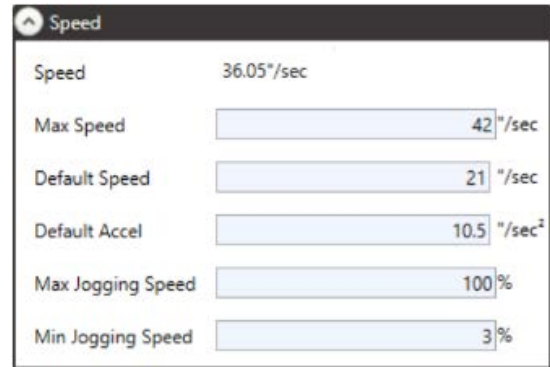


2. Verify that the unit traveling on stage has as much travel as possible and that the travel path is clear.
3. While watching the Speed section, smoothly slide the Manual Jog Slider until it is at 100% (or use the jogging controls on the Stagehand face). Look at what speed is being indicated in the Speed section of the Stagehand Properties Panel. Depending on encoder sensitivity, you may see the number flicker. It's best to use the smaller of these numbers, or if there is a large discrepancy between the flickering numbers, use a number slightly lower than the highest.



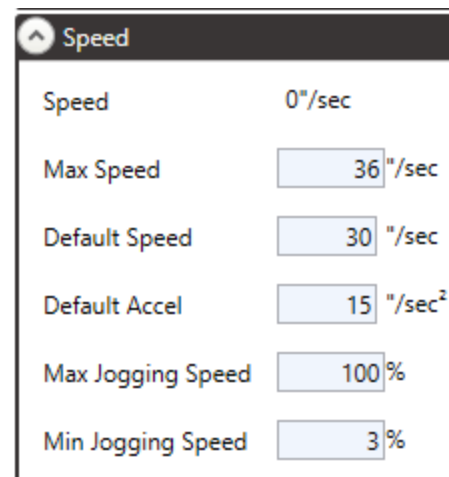
If you are getting help from a friend, it is best practice to have the person controlling the unit watch the unit. Look for any obstructions, and know when you need to slow down and stop

at the end of travel. Your friend will watch for the Speed in Spikemark.



4. Once you know the speed, type that into the Max Speed input field and press Tab or click in the white space on the Cue Grid to confirm the number.

In this example, we saw 36.05"/sec, so we set our Max Speed to 36"/sec, and also adjusted our Default Speed and Default Accel to a good general movement speed. We used 30"/sec to give us room to increase the speed as the design team may (and typically will) request.



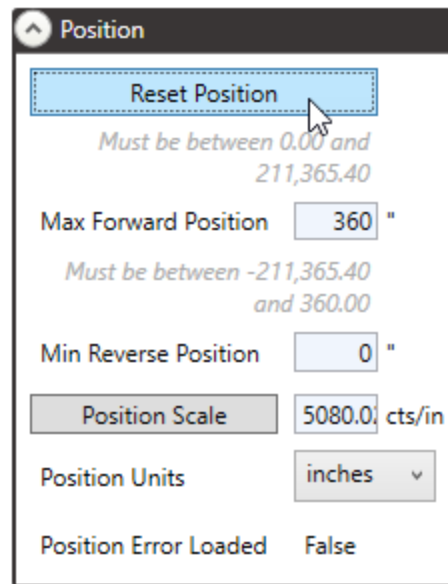
SETTING SOFT LIMITS

Soft limits (software limits) limit target positions in cues. These values, Min Rev Position and Max Fwd Position, only act on cued motion - you are still able to manually jog past these limits. Soft limits and hard limits should be used together to avoid overtravel.

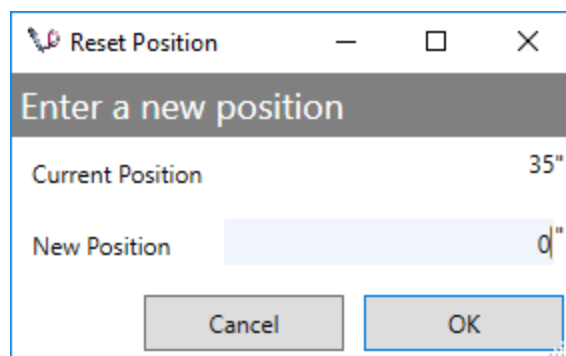
1. Using the **Manual Controls** section in the **Stagehand Properties Panel**, drive the motor in the Reverse direction until it travels as far as you feel comfortable.



2. Click the Reset Position button in the **Position** section of the Stagehand Properties Panel.



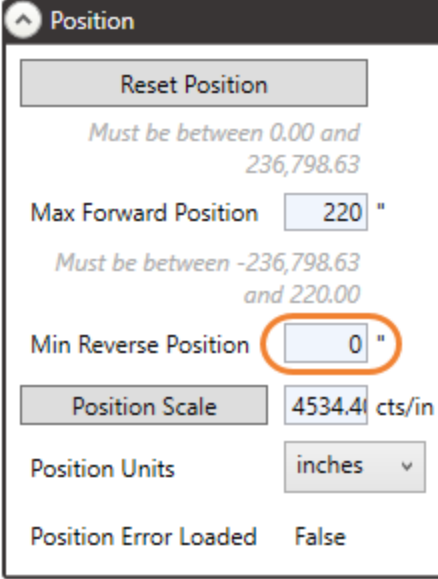
3. Enter "0" in the Reset Position dialog box. Press OK.



4. Place a piece of spike tape on the stage floor to mark the motor's physical position at the "0" location.

5. In the Position section of the Stagehand Properties Panel, enter “0” for the Min Rev Position, and then press Tab or click in the blank, white space to confirm the number.

This will prevent you from accidentally writing cues less than 0.



Position

Reset Position

Must be between 0.00 and 236,798.63

Max Forward Position 220 "

Must be between -236,798.63 and 220.00

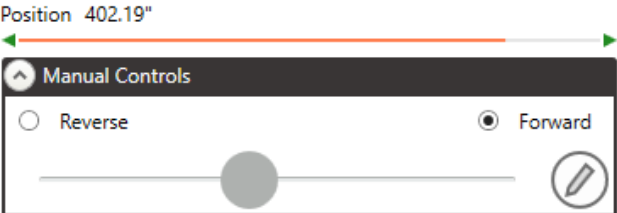
Min Reverse Position 0 "

Position Scale 4534.4 cts/in

Position Units inches ▾

Position Error Loaded False

6. Using the **Manual Controls** section in the **Stagehand Properties Panel**, drive the motor in the Forward direction until it travels as far as you feel comfortable.



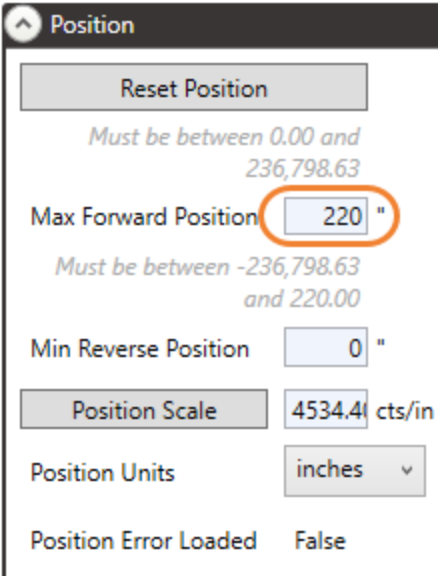
Position 402.19"

Manual Controls

☐ Reverse ☒ Forward

Slider control with a green arrow pointing right.

7. In the **Position** section of the **Stagehand Properties Panel**, enter your current motor position as the Max Fwd Position, which will prevent you from writing cues greater than the current motor position.



Position

Reset Position

Must be between 0.00 and 236,798.63

Max Forward Position 220 "

Must be between -236,798.63 and 220.00

Min Reverse Position 0 "

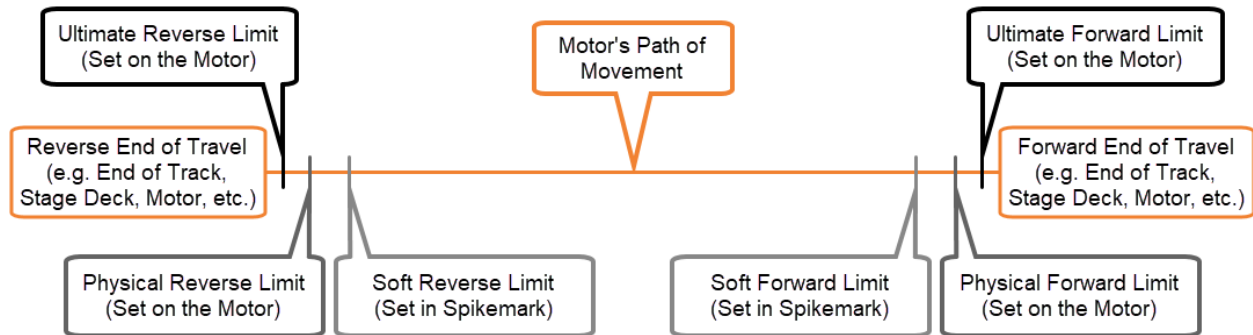
Position Scale 4534.4 cts/in

Position Units inches ▾

Position Error Loaded False

SETTING HARD LIMITS

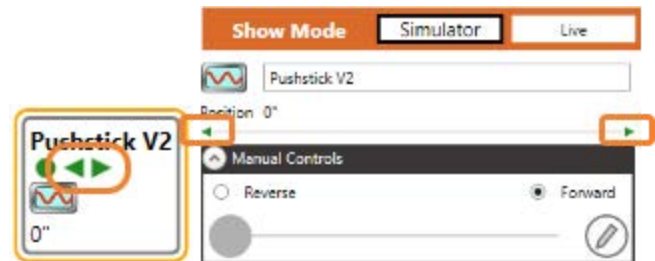
Before we run any cued motion, it's time to set the hard limits. Hard limits should be set for any machine you have - save for a turntable. The Hard Limits will stop the machine in case it loses its home position or there is an encoder failure prior to crashing.



When setting limits, always allow yourself some room for overtravel.

1. Start by checking that Spikemark reads the limits correctly by actuating each one individually and verifying that Spikemark reads that limit correctly.

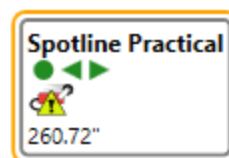
When the Forward (FWD) and Reverse (REV) limits are clear (not actuated), the left facing (REV), and right facing (FWD) arrows will be green.



When a limit switch is engaged, you will see a red indicator arrow. Once the switch is cleared the arrow will return to Green.



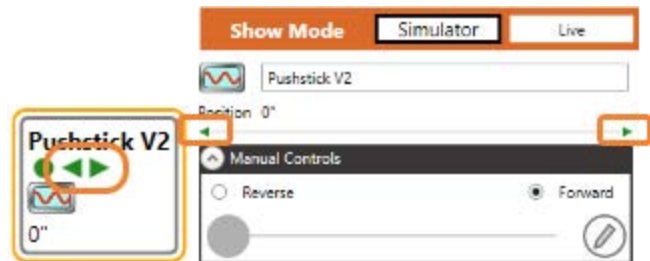
When either of the Ultimate (ULT) limits are activated, you will see a limit symbol next to the motor name in the Stagehand Properties Panel, and in the Motor Icon on the Cue Grid. When cleared, the icon will resume the normal status of the motor.



2. Once all limits are verified working, slowly jog to the scenic unit to the furthest safe extents of travel. Place your hard limits accordingly and when space allows, allow for 6" to 12" of overtravel

past the limit. This gives you a little bit of space to allow the unit to come to a stop once that limit is activated.

3. Once the limit is physically placed, manually jog the unit back off the limit. Verify that Spikemark no longer registers that limit, and then manually jog the unit on the limit again. Verify that the unit **stops** where you need it to stop. Repeat this for each hard limit.



NOTE:

Be ready to stop the movement immediately if you jog past the location where you want the unit to stop.

TESTING CUE MOVEMENT

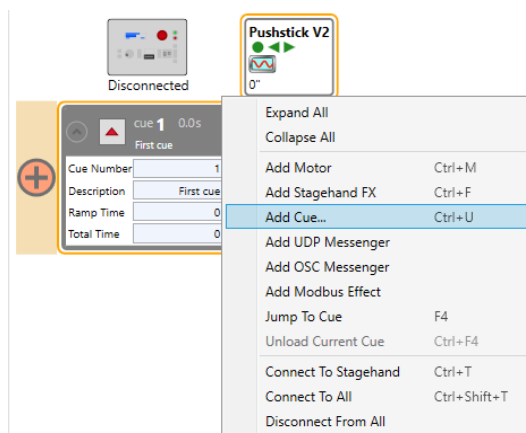
Now that we have confirmed that we can move our motor accurately and safely by manually jogging it, we are ready to test Spikemark! We just set our Maximum Forward Position and Minimum Reverse Position, so Spikemark will automatically prevent us from writing a cue outside of those values.

WRITING TWO SAMPLE CUES

In the following steps, the first cue will send a motor to its Maximum Forward position (Max Fwd Position) and the second cue will send it back to its Minimum Reverse position (Min Rev Position). There's already a Cue 1 defined by default when you open Spikemark, so we'll add a Cue ".5," which will allow this cue to start before Cue 1.

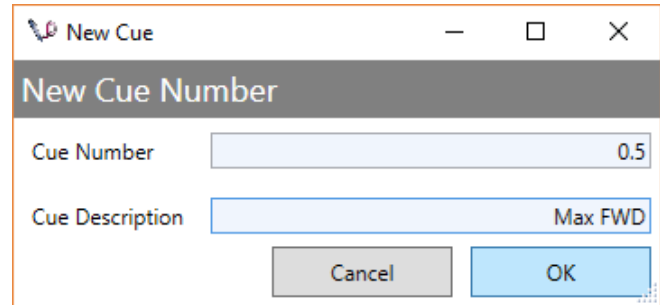
1. Right-click in the **Cue Grid** and select Add Cue.

You could also press Ctrl + U, or from the Cues menu, click Add Cue.

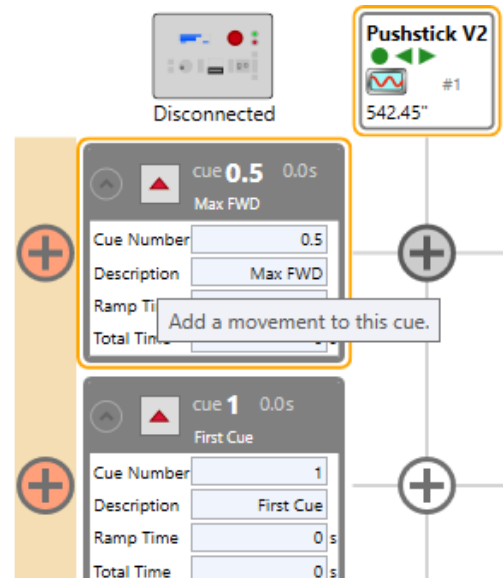


2. Enter a Cue Number and a Cue Description in the New Cue dialog box and click OK.

Cue numbers can be any positive decimal value (1, 2.34, 1008.38972, etc.); Cue descriptions are labels you can use to help identify what the cue does and use to quickly search for a cue when running a show.

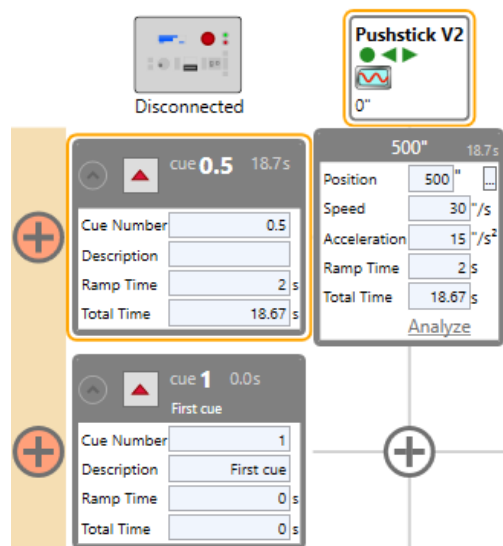


3. Add a movement for Pushstick v2 in Cue .5 by pressing the “+” button in the Cue Grid.



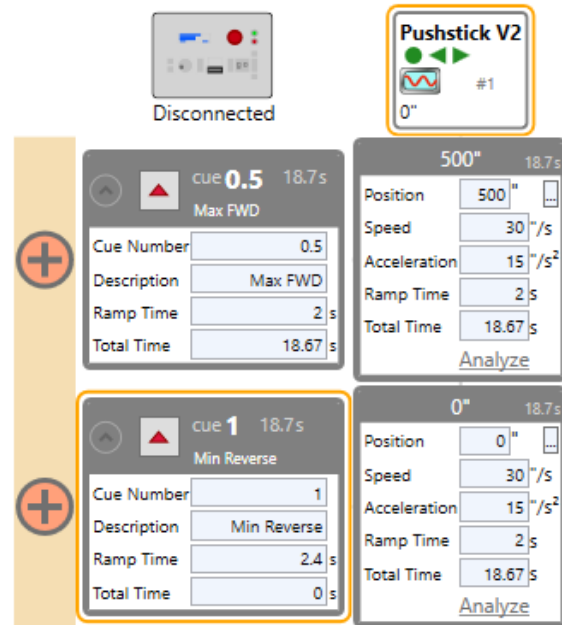
4. Change the Position number in the Cue Grid to match the value you entered as the Max Forward Position.

*In the example below, the value would be “500.” This value is also held in the Max Fwd Position field in the **Position** section of the **Stagehand Properties Panel**.*



5. Leave the Speed and Acceleration values as their default values.

6. Now that we've added Cue .5, let's write another Cue. By default, Cue 1 already exists. Enter its Description as "Min Reverse," then repeat steps 3 through 5 and enter a Position value of "0".

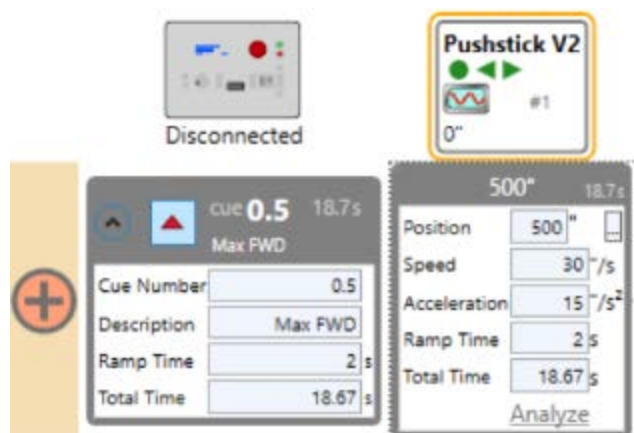


RUNNING THE TWO SAMPLE CUES

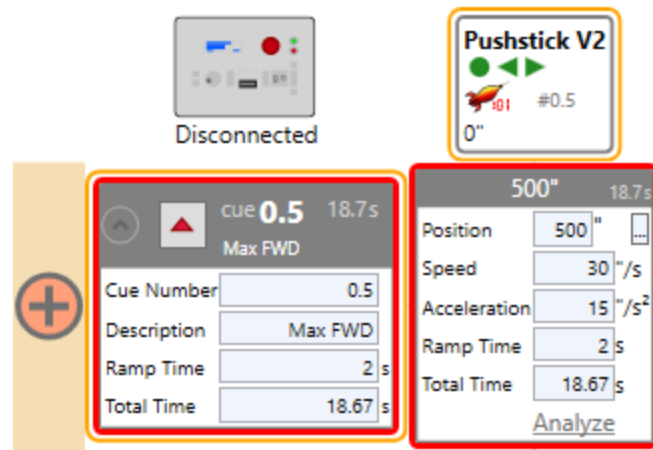
NOTE:

Depending on your system, the cues may or may not work well at this point. We're going to run the cues with the default motor tuning values and hope for the best. If the default tuning isn't good enough, the motor won't complete the cue, it will just sit there struggling at very low speed to complete the cue. Don't worry if your cue doesn't run well yet, we'll fix it with motor tuning in the next section.

1. To load Cue .5, press the **Load** button on the cue in the **Cue Grid**.



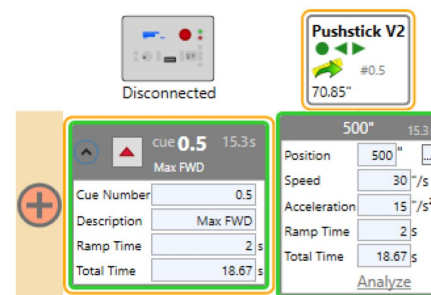
2. The border around the cue box will turn red, indicating that the cue is loaded.



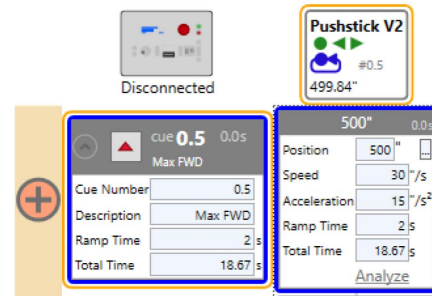
3. To run Cue .5, press the **Run** button (or hotkey F5) in the **Cue Controller** section on the right lower side of the screen.



4. As the cue is running, the border around the cue box in the Cue Grid turns green.



- When the cue completes, the border around the cue in the Cue Grid turns blue.



NOTE:

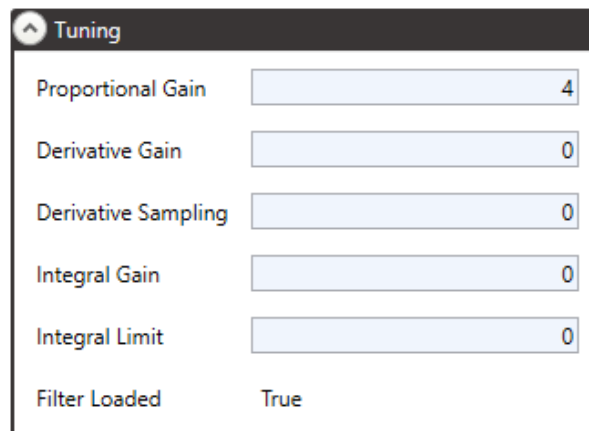
If the border stays green, but the motor is no longer moving, this means that the motor tuning needs to be improved. Abort the cue by pressing the Emergency Stop button on your Showstopper and go to the next section: “Basic Tuning,” below.

If the border around the cue box in the Cue Grid is blue and has properly completed, then run Cue 1 by repeating steps 1 through 5 above.

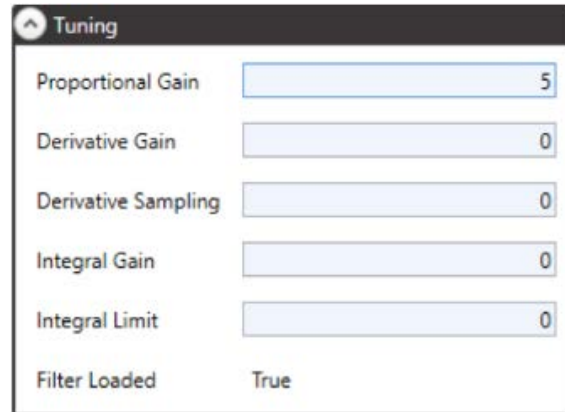
BASIC MOTOR TUNING

If your first attempt at running cues didn't work and the motor never fully completed the cues, then the tuning values need to be adjusted. Tuning can be complex, but we're going to take a practical approach in this section without getting bogged down in the complex mathematical details. For more information, see the “Motor Tuning” section.

- In the **Stagehand Properties Panel** on the right side of the screen, scroll until you find the **Tuning** section.



2. Increase the **Proportional Gain** value by 1.



The screenshot shows a 'Tuning' window with a dark header and a light body. It contains six rows of controls. The first five rows have a label on the left and a numeric input field on the right. The sixth row has a label on the left and a boolean input field on the right. The values in the input fields are: Proportional Gain (5), Derivative Gain (0), Derivative Sampling (0), Integral Gain (0), Integral Limit (0), and Filter Loaded (True).

Parameter	Value
Proportional Gain	5
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	True

3. Run a Cue to move the motor to the opposite side of the stage by following the instructions in the previous section: "Running the Two Sample Cues."

If the Cue now completes successfully, you are done. Otherwise repeat steps 1 through 3 until the motor repeatedly completes the cues successfully. If you follow these steps and do not obtain your desired results, see the section on Motor Tuning.

CONFIGURING STAGEHANDS AND DEVICES

SHOWSTOPPER 3 DEVICES

The Showstopper 3 Consolette and the Spikemark Pendant are two accessories that can connect to the Spikemark network to remotely control your scenery. Section 2.2 covered the network setup of each device, but we'll go into a little bit deeper detail about the settings and configuration you might find in Spikemark.

For detailed information on the use and operations of the accessories themselves, check out the Showstopper 3 Consolette Manual and our Spikemark Pendant Manual on our website www.creativeconners.com/resources/#Manuals.

SHOWSTOPPER 3 CONSOLETTTE

The Showstopper 3 Consolette is a great way to control Spikemark during setup, tech, and performance. This next iteration of our Showstopper adds several great features:

- Jog with the joystick
- Jog by incremental position using the wheel
- Status display on a four-line OLED screen
- Optional Hold-To-Run operation for additional safety

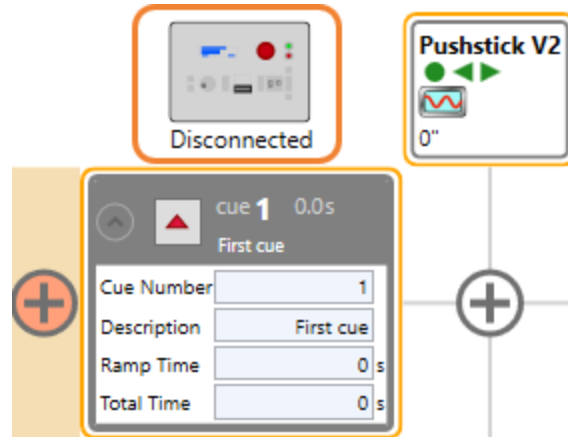
Unlike its predecessor, the new Showstopper 3 Consolette connects to Spikemark over the same Ethernet network as your Stagehand controllers. This is a substantial change from the previous USB Showstopper. The network connectivity makes it easier to use with Spikemark computers that have a limited number of USB ports. It makes it easier to use the Showstopper with a backup show computer since you won't need to physically move cables when flipping over to the backup computer. Finally, it also offers more cabling flexibility if you want to temporarily drag the Showstopper on stage to run some cues or jog a motor.



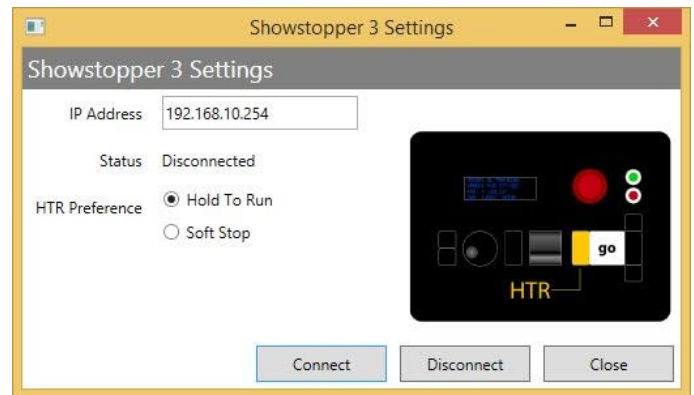
This all sounds great, but since the Showstopper is now another network connected device, we need some way to connect to it, adjust preferences, and set the IP address.

ACCESSING THE SHOWSTOPPER 3 CONSOLETTTE SETTINGS MENU

1. Click the Showstopper 3 Settings button in the top left corner of the **Cue Grid**.



2. The Showstopper 3 Settings window will appear.



IP Address - Set this field to match the IP address of your Showstopper 3, which can be found by pressing its wheel and selecting Set IP Address on the Consolette.

Status - This label will update to show if the Showstopper 3 is Disconnected, Connecting, or Connected to the Spikemark computer.

HTR Preference - You can select either Hold To Run or Soft Stop to affect how the button on the left side of the Go button behaves. The two options are:

1. **Hold To Run** - The button must be held down continuously while you are running cues. If you release the button, Spikemark will issue a Soft Stop command to all machines causing everything to decelerate immediately. If this option is selected, a loss in normal network connection to the Showstopper 3 will also cause a Soft Stop. This is commonly referred to as a “dead man’s switch”, but Hold To Run is the more politically correct term since most automation vendors dare not mention a “dead man” in the same breath as “automation”. Marketing terminology aside, the operating principle is the same: let go of the button and scenery stops moving.

- 2. Soft Stop** - The button will send out a Soft Stop command if it is pressed, but does not need to be held down during normal operation. This is the familiar operating mode to users of the previous Showstopper models.

Which HTR mode should you choose? That choice is left up to you. There is certainly momentum in the entertainment industry towards Hold To Run as the standard. For less experienced operators, or venues where the automation must be run by technicians who are serving double-duty as operators and stagehands, Hold To Run is clearly safer since it forces an otherwise distracted automation operator to pay attention to what is moving on stage. For professional operators, or operators that accept the responsibility of the task with appropriate discipline, Hold To Run offers only a sore thumb and possibility that a mistimed sneeze will stop the show. Choose appropriately.

Connect - Pressing this button will try to establish a network connection with the Showstopper 3 and close the dialog box.

Disconnect - Pressing this button will sever the network connection with the Showstopper 3.

Close - Pressing this button will just close the dialog.

After you set the IP address and select your preferred HTR mode, press the Connect button. After the dialog box closes, if a Showstopper 3 was found on the network, the button in the cue grid will change its appearance to show that the Showstopper is connected and functioning.

Although we really like the features of the Consolette, you are not required to have one. If you are running the Showstopper 2 or not using a Consolette, simply click on the Consolette settings and choose Disconnect. The Consolette will show Disconnected and you will be able to use your original Showstopper.

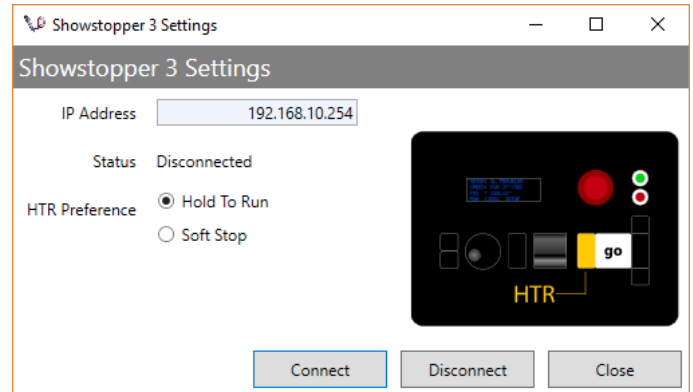


CONNECTING TO THE SHOWSTOPPER 3 CONSOLETTE

1. Click on the Showstopper 3 Consolette (SS3C) Icon in the top left corner of the **Cue Grid** to open the Showstopper 3 Settings Window.



2. The SS3C will display Disconnected and an IP Address (192.168.10.254). Confirm this IP Address matches in the IP Address input field and click Connect at the bottom of the window.



3. The Showstopper 3 Settings Window will automatically close, and the SS3C Icon will show that it is Connecting.
4. Once a connection has been established, the SS3C Icon will turn black and display Connected.



SPIKEMARK PENDANT

The Spikemark Pendant is one of the newest control methods added to the Creative Conners arsenal. It is a tool that essentially allows you to carry the fundamentals of Spikemark around the stage while you are building and setting up your show file.

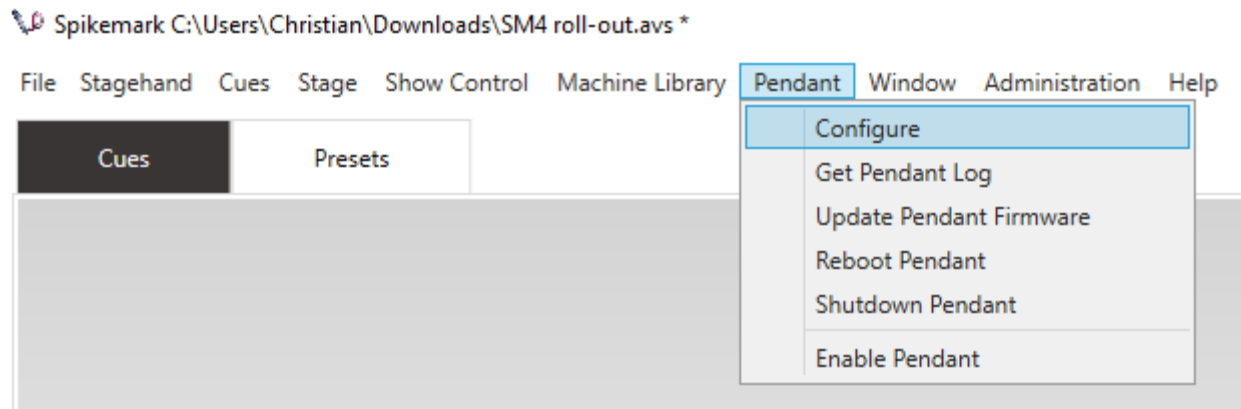
- Manually jog motors and motor groups using either the Jog Wheel or Joystick.
- Run to a pre-made Spike.
- Update the location of a Spike.
 - *Pro Tip:* You cannot create new spikes from the Spikemark Pendant. The best method for use during a show set up is to go through the script with a member of stage management to determine all the locations for each scenic unit. Before rehearsal, create a spike for each location in Spikemark and then during rehearsal, simply jog the unit into the design-team-desired location, and press Update Spike. If you think there may be additional locations added, feel free to add as many extra spikes as you like and delete any leftovers.

For detailed instructions on using the Spikemark Pendant, view the manual at <http://cci.fyi/pendant>.

NAVIGATING THE PENDANT MENU

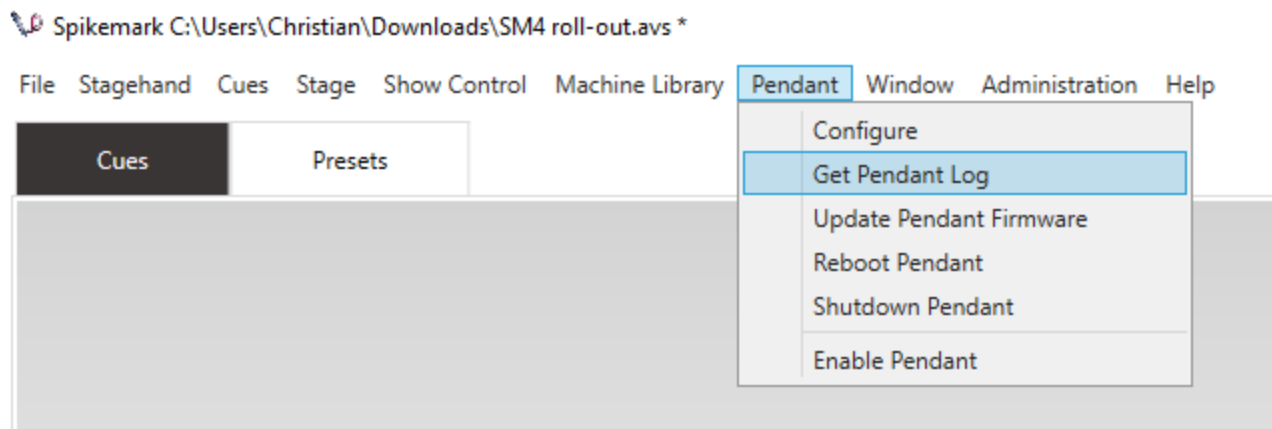
CONFIGURE

Displays the Pendant's connection settings.



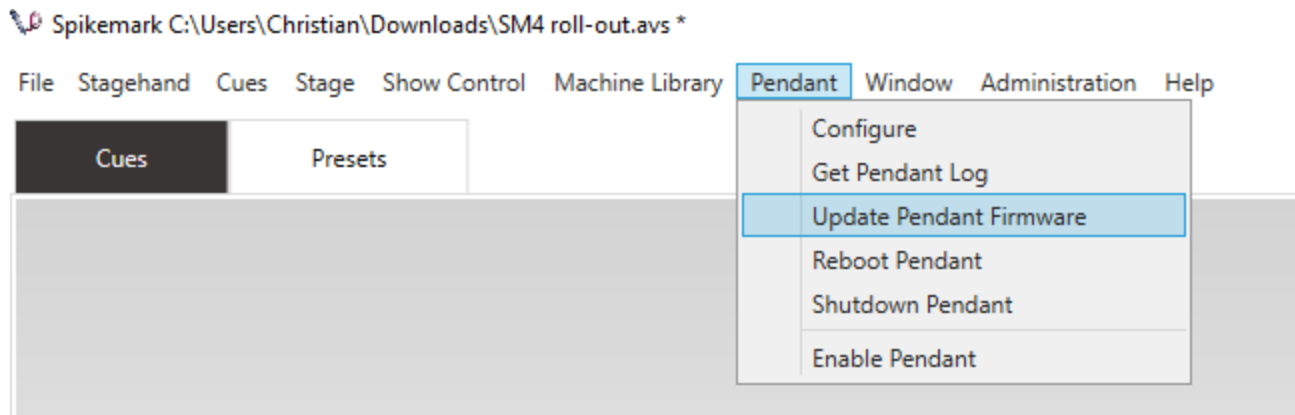
GET PENDANT LOG

If you encounter issues while using the Pendant select Get Pendant Log and follow the prompts. Once downloaded to your computer, email the Pendant log, along with the current show file and the last three Spikemark logs to support@creativeconners.com.



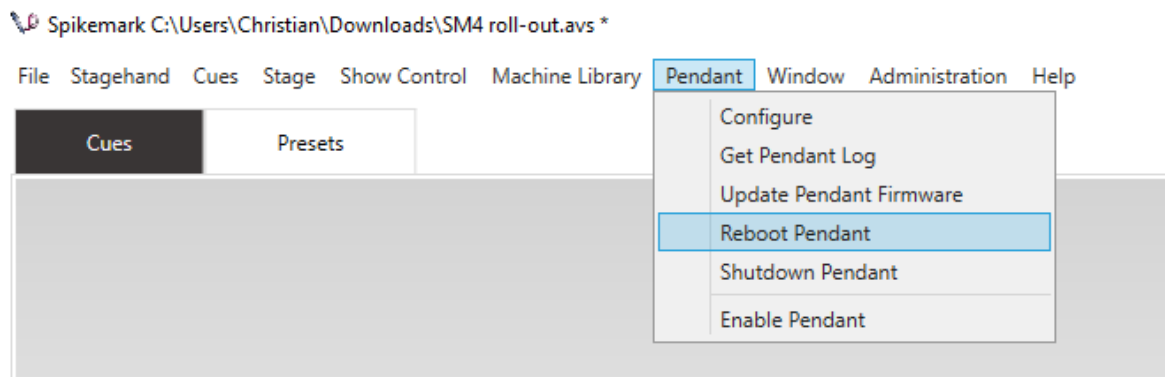
UPDATE PENDANT FIRMWARE

When updated firmware is released, it can be installed to the Pendant from Spikemark by clicking Update Pendant Firmware.



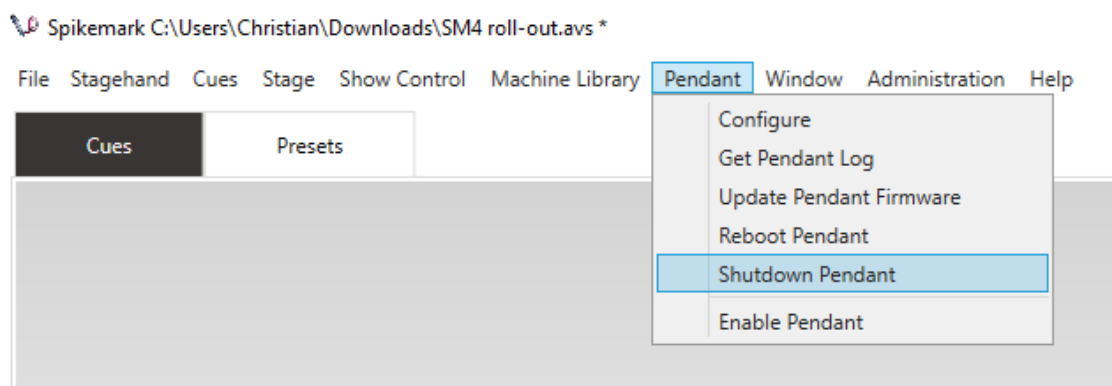
REBOOT PENDANT

Occasionally the Pendant will need to be rebooted. Select Reboot Pendant from Spikemark, once rebooted, reconnect from the Pendant display.



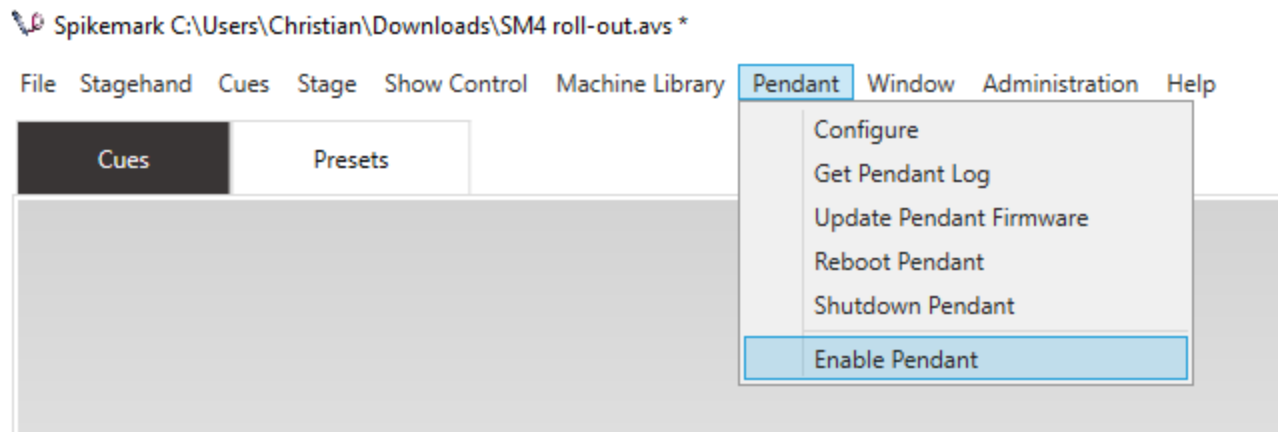
SHUTDOWN PENDANT

To shut down the Pendant, select Shutdown Pendant from Spikemark. Once the Pendant display is blank, it is safe to unplug the Pendant.

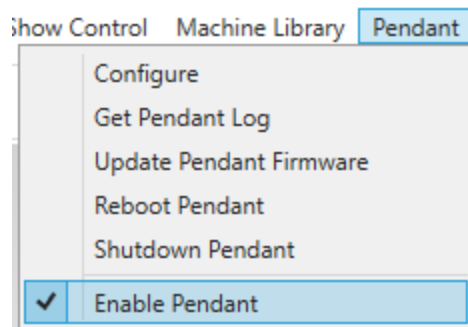


ENABLE PENDANT

Enable Pendant allows the Pendant to communicate with Spikemark.

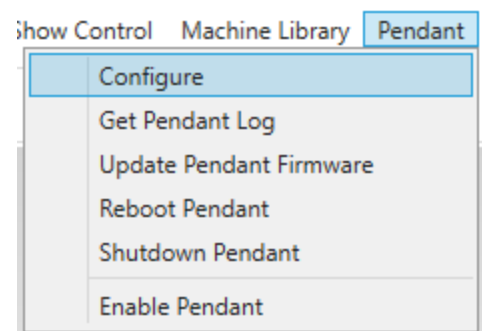


If Enable Pendant isn't checked, the Pendant will not be able to connect.



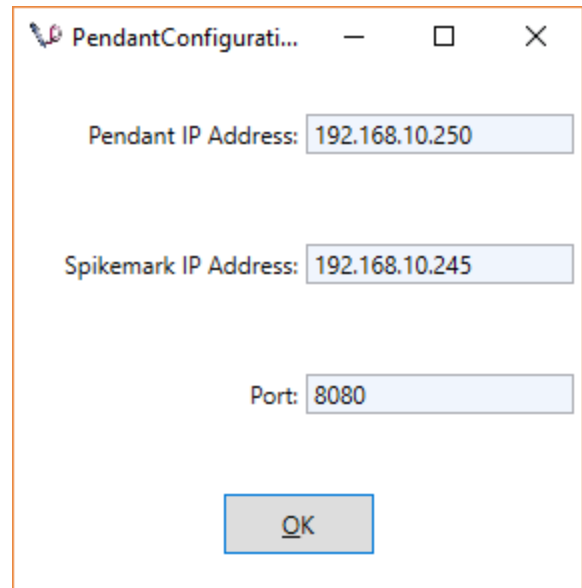
CONNECTING TO THE SPIKEMARK PENDANT

1. Click on **Pendant** in the Menu Bar and select Configure to open the Pendant Configuration Window.



2. When the Pendant powers on, the main screen will display the same three input fields seen here. Ensure that the information matches on both the Pendant and Spikemark.

When all information is entered and verified, click OK to close the Pendant Configuration Window.

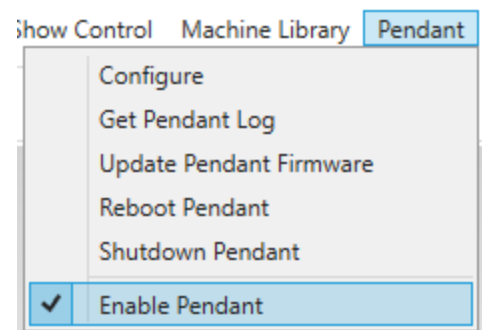


The image shows a window titled "PendantConfigurati...". It contains three input fields: "Pendant IP Address:" with the value "192.168.10.250", "Spikemark IP Address:" with the value "192.168.10.245", and "Port:" with the value "8080". At the bottom is an "OK" button.

3. Click on **Pendant** in the Menu Bar and select Enable Pendant.

The drop down window will close, but if you click on Pendant in the Menu Bar again, you should see a check mark next to Enable Pendant. This signifies that Spikemark is ready to connect to your Spikemark Pendant controller.

Complete the connection process from the Pendant.



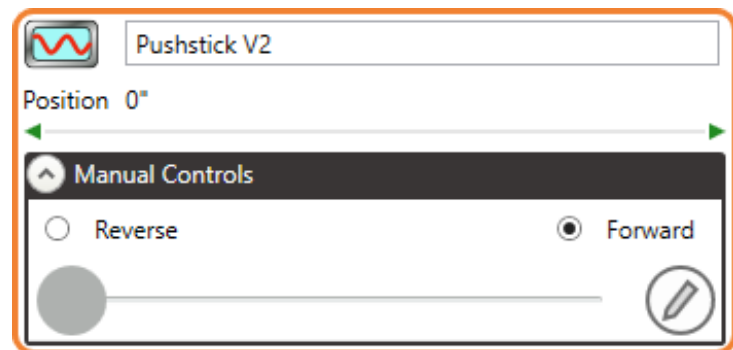
STAGEHAND PROPERTIES PANEL

The **Stagehand Properties Panel** is loaded with information, and it is easy to initially feel overwhelmed with all of these details. While we've gone through some of the panes in the previous sections, now is the time to dive deeper into each tab - and how the Properties Panel differs depending on the Stagehand type. Let's begin with the Basic Motor Information.

BASIC MOTOR INFORMATION
























Locked to the top of the properties panel and always visible you will see essential information about the selected motor including status, name, position, and limits status. Directly below this are the manual controls, which can be collapsed to save screen real estate.

- Motor Status Icon
- Motor Name
- Position - Numerical and Graphic
- Limit Indicators
- Manual Controls Tab



MOTOR STATUS ICONS

Motor status information is displayed next to the motor name in the Stagehand Properties Panel and in the Cue Grid column headers. Take a look at the list below for details of each icon.

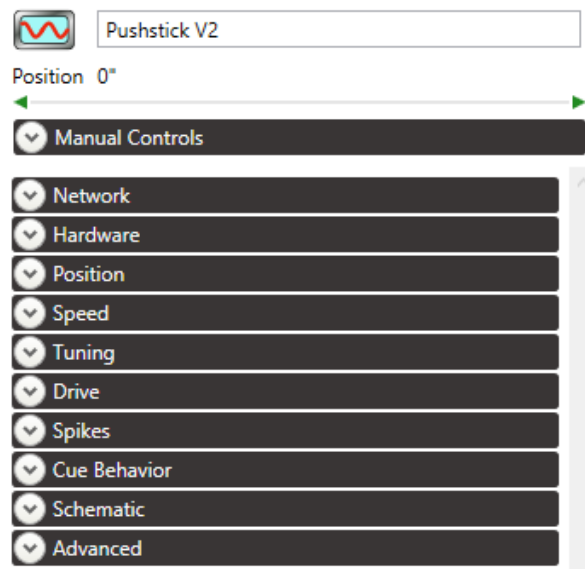
Icon	Status	Icon	Status
	Motor disconnected from the network.		Running a cue forward in target-tolerance mode.
	Motor connected to the network, but idle.		Running a cue forward in strict-timing mode.
	Motor is inactive and won't run cues or affect cue links		Running a cue reverse in target-tolerance mode.
	Motor has completed a cue.		Running a cue reverse in strict-timing mode.
	Stopped because the motor drive has faulted.		Stopped by a forward limit switch on the motor.
	Emergency stop.		Stopped by a reverse limit switch on the motor
	Cue loaded.		Stopped by a position error fault.
	Soft stopping, but not yet fully stopped.		Brake fault indicator
	Stopped mid-cue by a soft-stop command.		Stopped by an Ultimate Limit.
	In manual mode with the motor enabled, but zero-speed.		Stopped by a group fault.
	Moving forward in manual mode.		A firmware update is available.
	Moving reverse in manual mode.		

INFORMATION PANES

The various values in the Stagehand Properties Panel are divided into collapsible panes. This allows you to customize your screen even further to make the most relevant information readily available. Just like in the Cue Grid, simply click anywhere on the heading of the tab to minimize or expand its information.

The first pane is Manual Controls, which is pinned to the top of the screen with the motor information. The remaining panes can be scrolled through using the center scroll wheel on your mouse or by using the vertical slider bar on the right.

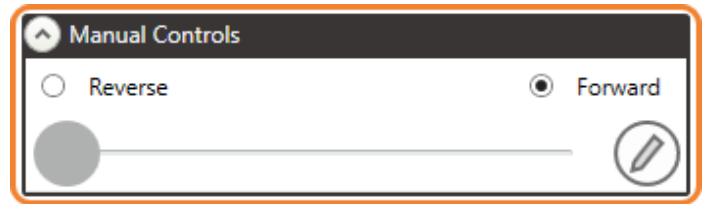
- Motor Information
- Manual Controls
- Network
- Hardware
- Position
- Speed
- Tuning
- Drive
- Spikes
- Cue Behaviour
- Schematic
- Advanced



MANUAL CONTROLS

Just below the basic motor information you can find the first tab, **Manual Controls**. From here you can select what direction you would like to move, change the labels for each direction, and use the slider to manually move (jog) a motor.

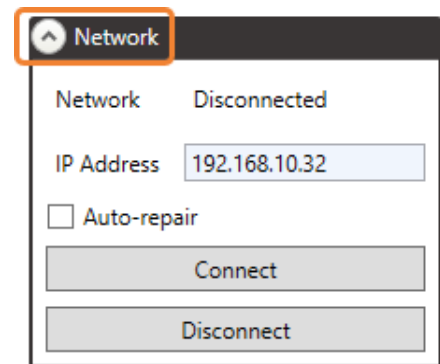
- **Reverse** - Select this to move the motor so that the encoder counts from higher to lower.
- **Forward** - Select this to move the motor so that the encoder counts from lower to higher.
- **Jog Slider** - Click and drag this smoothly to the right to increase speed. When you're getting close to your destination, smoothly drag it back to the left to decrease speed, and then drag all the way to the left and release to stop.
- **Edit Labels Button** - Click the pencil to edit the direction labels. For example, instead of Reverse and Forward, try Stage Right and Stage Left to reduce confusion.



NETWORK

The **Network** pane contains the settings for the Ethernet connection between Spikemark and the Stagehand. The fields in the Network section are described below:

- **Network** - The Network field displays the status of the network connection.
 - a. Disconnected - connection is not made
 - b. Connecting - attempting to connect
 - c. Connected - connection is established
- **IP Address** - This tells Spikemark where to send the data to. Make sure each device on the network has its own unique IP Address and that the IP Address in the Network Pane matches the IP Address on the face of the corresponding Stagehand.
- **Auto-Repair** - Select this checkbox to automatically attempt to reconnect when the connection is lost. It will also attempt to connect automatically when switching into Live Mode or first opening Spikemark.
- **Connect** - While there are a couple different ways to connect, this button is the most obvious way to establish a connection to your Stagehand.
- **Disconnect** - Again, this is the most obvious way to disconnect from a Stagehand, or to stop attempting to connect to a Stagehand.



HARDWARE

The Hardware section displays information about the connected Stagehand control card.

- **Stagehand** - This identifies what control card the selected Stagehand is running:

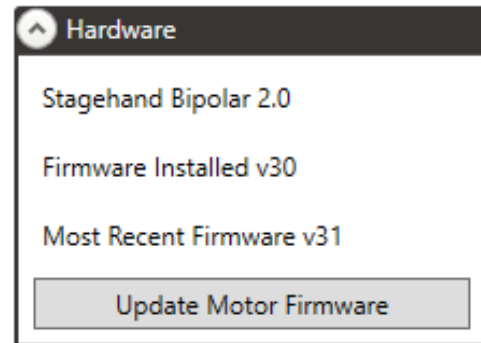
- a. Stagehand Bipolar 1.7
- b. Stagehand Bipolar 2.0
- c. Stagehand Unipolar
- d. Stagehand FX

- **Firmware Installed** - This is the Firmware currently installed on your Stagehand.

- **Most Recent Firmware** - Firmware is distributed and updated through Spikemark. The most recent version of the firmware will be displayed here.

- a. See the troubleshooting section if “unknown” is displayed

- **Update Motor Firmware** - When a firmware update is available it can be installed with a click.
 - a. We are big fans of updated firmware - please install updates as they are available.



POSITION

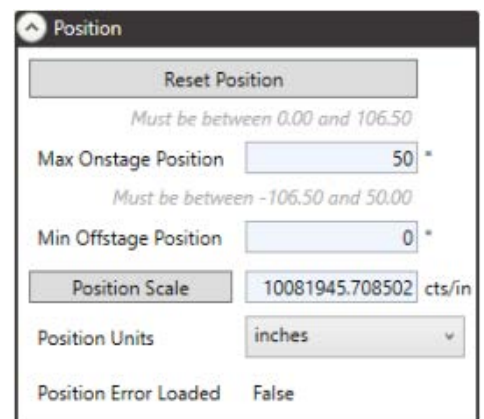
The **Position** tab is chock full of information for the selected Stagehand Controller's position. You'll find yourself here at every single load in and anytime you need to reset the position.

RESET POSITION

Much as the name suggests, this is how you reset the current position of the machine so Spikemark and the real world are aligned. There are several reasons why one would need to reset the position:

- Loading in and creating the zero position.
- Adjusting for position drift.

Resetting position is as simple as clicking the button, entering the new position (in selected units) and clicking OK.



SOFT LIMITS

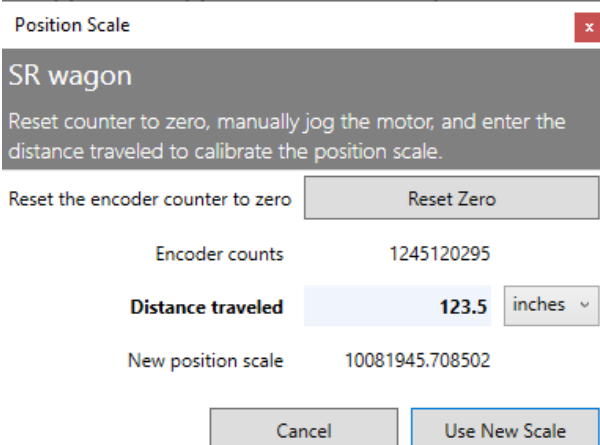
Soft limits (AKA: Software Limits) determine the maximum and minimum cue-able positions for the motor. In the above image, the soft limits are set for the Max Onstage Position (FWD) and Min Offstage Position (REV). Soft limits only affect cues and the Move to Position function - you will still be able to manually jog your motor past these limits. Soft limits work in tandem with properly set Hard Limits.

POSITION SCALE

Position scale specifies the ratio between the stream of 1000's of encoder counts per unit traveled into humanly relatable numbers such as inches, feet or degrees. With the proper position scale defined, you can view the motor's current position and write cues in a more user-friendly manner.

When a piece of scenery moves, an encoder connected to that scenery spins. As the encoder spins, it generates a stream of electrical pulses. The Stagehand controller connected to the encoder counts those pulses to determine where the scenery is actually located. The Stagehand relays the position back to Spikemark which then displays the position information on screen. Occasionally you may want to display the encoder counts in Spikemark, but most often (99.9% of the time) it will be easier to display the actual distance traveled. Position Scale can be determined with a calculator and tape measure, or use the built in Position Scale Wizard - just click on the Position Scale Button!

- **Reset Zero** - Click here to reset the position to zero.
- **Encoder counts** - How many encoder counts have been counted.
- **Distance Traveled** - Place a tape mark on the deck, manually drive the unit away (as far as reasonably possible), measuring the distance traveled and enter it here.
 - a. Spikemark requires a positive position scale. If your encoder counts are '-' simply enter the distance traveled as a negative number, starting with the number itself, then going back and inserting the "-" before the number.
- **New Position Scale** - Spikemark calculates the new position scale here. To use it, simply click the **Use New Scale** button.



The image shows a 'Position Scale' dialog box with a title bar and a close button. The main area has a dark header 'SR wagon' and a light gray instruction box: 'Reset counter to zero, manually jog the motor, and enter the distance traveled to calibrate the position scale.' Below this, there's a 'Reset the encoder counter to zero' label and a 'Reset Zero' button. A table displays 'Encoder counts' as 1245120295, 'Distance traveled' as 123.5 inches (with a dropdown arrow), and 'New position scale' as 10081945.708502. At the bottom are 'Cancel' and 'Use New Scale' buttons.

Encoder counts	1245120295
Distance traveled	123.5 inches
New position scale	10081945.708502

If you prefer to calculate the position scale without the help of Spikemark, it is a straightforward calculation:

Encoder Counts ÷ Distance Travelled = Position Scale (counts per unit)

Example:

1,245,120,295 encoder counts ÷ 123.5 inches = 10,081,945.7085 counts per inch

UNITS

Spikemark can display position as inches, feet, millimeters, meters or degrees. Therefore, rather than having to type 1,245,120,295 encoder counts, you would enter 123.5 inches or 360 degrees. Spikemark displays a maximum of 2 decimal points. 123.50" or 10.33' are the same distance.

POSITION ERROR LOADED

Position Error Loaded is a simple tool to tell you when Spikemark has loaded the Max Position Error value for cued motion. Prior to motion beginning, the value will be False, once motion has begun the value will be True.

- False - This indicates that Spikemark **will not stop** for a position error.
- True - A Max Position Error has been calculated and accepted. If the machine is outside of this tolerance at any point during the move, it will automatically fault and stop that move.

If you've been using Spikemark for a couple generations, you'll notice that the Max Position Error input field and Abort On Position Error check box are missing. These tools have been relocated to the **Advanced** tab at the bottom of the **Stagehand Properties Panel**.

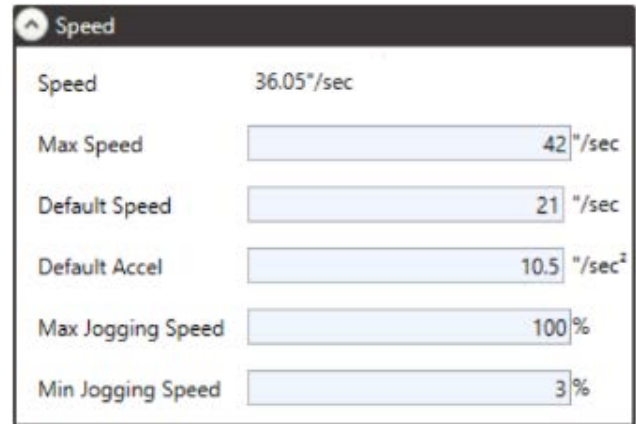
The screenshot shows the 'Position' panel with the following settings:

- Reset Position**: A button at the top.
- Max Onstage Position**: A text input field containing '50' with a unit dropdown set to 'in'. A note below it says 'Must be between 0.00 and 106.50'.
- Min Offstage Position**: A text input field containing '0' with a unit dropdown set to 'in'. A note below it says 'Must be between -106.50 and 50.00'.
- Position Scale**: A button next to a text input field containing '10081945.708502' with a unit dropdown set to 'cts/in'.
- Position Units**: A dropdown menu currently set to 'inches'.
- Position Error Loaded**: A button set to 'False', which is circled in orange.

SPEED

The Speed tab is full of useful information on how fast your motor can go as well as default speed and acceleration values used for cue writing. There are also values for Max & Min Jogging Speed as a percentage of 100%.

- **Speed** - Spikemark calculates the indicated speed based on the position scale and displays it here as the motor is moving. This is especially useful for calculating your Max Speed on a custom machine or if you need to over-speed a stock machine.
- **Max Speed** - This is the fastest speed that can be programmed in a cue.
- **Default Speed** - This is the value dropped into the Speed field of any new movement (cue). It's recommended to begin with this value between 50%-75% of the max speed. This value can be adjusted at any time.
- **Default Accel (and Decel)** - Movements will use this Default Accel to automatically populate the Accel field. Try using $\frac{1}{2}$, $\frac{1}{3}$ or $\frac{1}{4}$ of the Default Speed to start out with. The lower the value, the longer the ramp time.
- **Max Jogging Speed** - This value allows you to clamp down on the maximum jogging speed when jogging using Spikemark, a Showstopper 3 Consolette, or a Spikemark Pendant. For example, a setting of 50% would only allow the unit to travel at $\frac{1}{2}$ the Max Speed when the jog control is fully engaged.
- **Min Jogging Speed** - Some motors or VFDs cannot accept as low a speed signal as others under jog control. When this is the case Spikemark might be trying to send a signal that is too low, causing erratic movement at low speeds. Increase the Min Jogging Speed here to the low threshold of your motor to achieve smooth jogging. 3% is a great starting point.



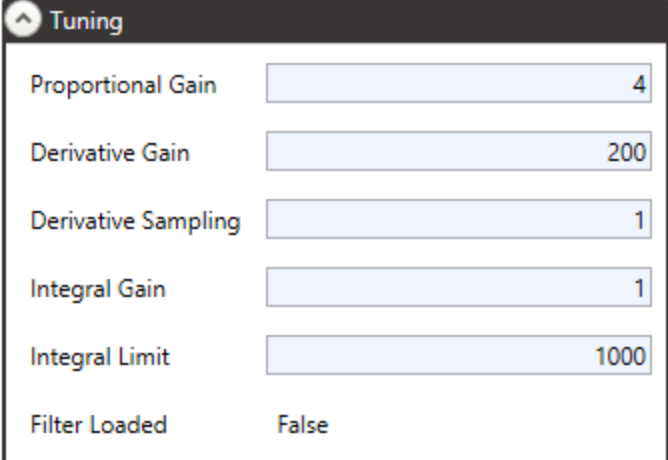
The screenshot shows a window titled "Speed" with a list of parameters and their current values or input fields:

Parameter	Value
Speed	36.05"/sec
Max Speed	42"/sec
Default Speed	21"/sec
Default Accel	10.5"/sec ²
Max Jogging Speed	100%
Min Jogging Speed	3%

TUNING

PID tuning is arguably one of the most difficult concepts to really grasp when it comes to programming scenic automation. PID tuning helps to create smooth and accurate motor motion. PID stands for Proportional, Integral and Derivative, which are the three variables Spikemark uses to adjust motion to correct for differences between the programmed speed signal and reality.

- **Proportional Gain** - The ratio of power to position error. The higher this value, the more power will be applied to correct for position errors. Increase by 1 with a minimum of 1.
- **Derivative Gain** - This is applied against changes in position error. It can have a dampening effect on a motor, absorbing the shocks from a high Proportional Gain. Typically apply at intervals of 100.
- **Derivative Sampling** - This describes how often the Derivative Gain is applied. Must be at least 1 if Derivative Gain is above 0. Rarely is Derivative Sampling over 2.



The screenshot shows a 'Tuning' window with a dark header and a light body. It contains five input fields for PID parameters and a status indicator. The values are: Proportional Gain: 4, Derivative Gain: 200, Derivative Sampling: 1, Integral Gain: 1, and Integral Limit: 1000. The 'Filter Loaded' status is set to 'False'.

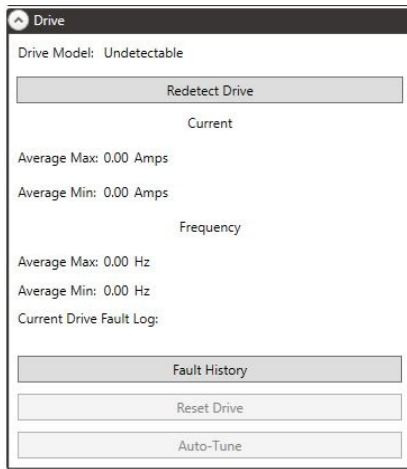
Parameter	Value
Proportional Gain	4
Derivative Gain	200
Derivative Sampling	1
Integral Gain	1
Integral Limit	1000
Filter Loaded	False

- **Integral Gain** - Computes corrective action by evaluating the position error and motor response over the cue. It often corrects the motor position at the end of travel. Increase by 1 or 2 points to help retain accuracy without sacrificing smooth travel.
- **Integral Limit** - Prevents a condition known as Integral Windup, which can lead to very erratic motor behavior. If you use Integral Gain, set Integral Limit to 1000.
- **Filter Loaded** - False indicates that the entered values are different than what is being used. True indicates that all entered values have been accepted and are being used. This will update to True automatically at the start of a movement if any changes were entered.

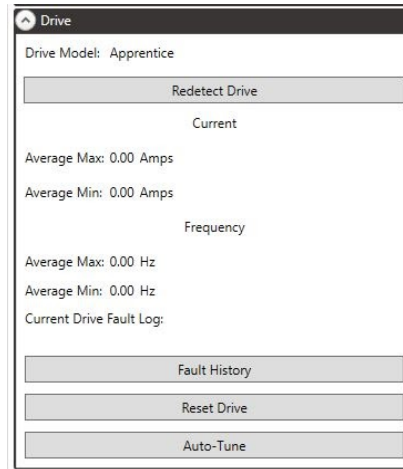
Check out our **Motor Tuning Flowchart**, a practical quick-guide, for getting the best results out of your motor.

DRIVE COMMUNICATION

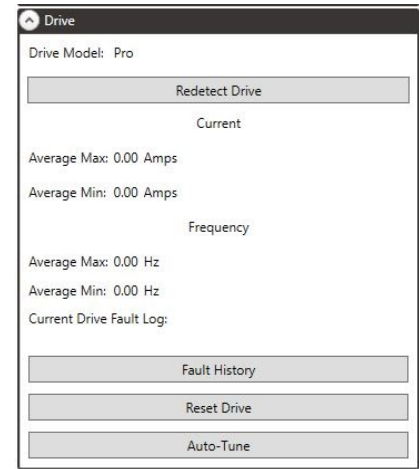
Spikemark 4 introduced a serial RS-485 connection between Spikemark and any Stagehand Pro or Stagehand Apprentice motion controller. With a compatible Stagehand you have access to several exciting features.



Undetectable Drive



Stagehand Apprentice



Stagehand Pro

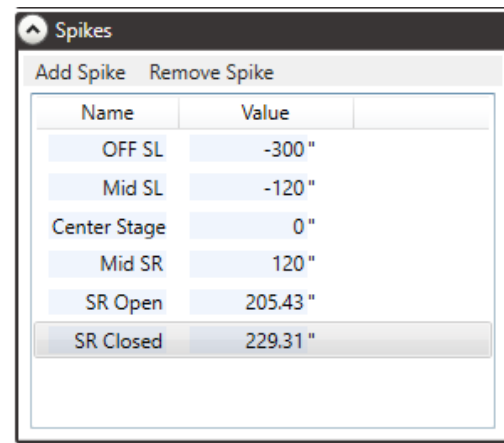
- **Drive Model** - The VFD will report back what model it is, and Spikemark is able to interpret that and tell you if you are using a Stagehand Apprentice or a Stagehand Pro. If this information isn't received, it will say Undetectable.
- **Redetect Drive** - If you are using a Stagehand Apprentice or Stagehand Pro and your VFD was not automatically detected, use this button to attempt to establish the connection.
- **Current** - While running, your Stagehand is constantly changing the amperage draw. Spikemark can now read these values through the Analyze button on a movement, displaying the Average Max Amps, and the Average Min Amps.
- **Frequency** - Similarly to Current, the frequency output is constantly changing to maintain the desired speed, and Spikemark will track the Average Max Hz and the Average Min Hz.
- **Current Drive Fault Log** - The VFD keeps a log of recent faults that it has encountered. The 10 most recent logs are displayed here.
- **Fault History** - A new window with additional VFD faults can be opened by clicking here.
- **Reset Drive** - Some VFD faults require the drive to be reset. In Stagehands of the past, the only way to do this was to engage the E-Stop, completely cutting power to the VFD. Now with protocols such as Safe Torque Off (STO), some VFDs don't completely lose power from the E-Stop. Instead of pulling the input power to the entire Stagehand, use the Reset Drive button.
- **Auto-Tune** - This button opens the Auto-Tune Window which allows you to view and adjust a specific set of VFD parameters, and also conduct an Auto-Tune procedure.

SPIKES

The **Spikes** tab is designed to mimic the usefulness of real spike tape. Rather than trying to remember bizarre motor position numbers (like 205.43"), you can now assign names to commonly used positions ('SR Open' = 205.43").

Often during the rehearsal process, the spike positions need to be changed. If you were physically pushing the wagons around, you would just move the spike tape on the stage floor to a new position. Similarly, with the Spikes feature, you simply edit the position of the spike in one place and all your cues that reference that spike are automatically updated. This will save you from manually having to make the change throughout all the cues where that motor is used.

- **Add Spike** - Click the button to create a new spike at the current location.
- **Remove Spike** - Removes the selected spike from the list.
- **Name** - Change the name of the spike to best suit your production. Click on this header to sort the spikes alphabetically.
- **Value** - The position the Spike is referencing. Click on this header to sort the spikes numerically from lowest to highest.

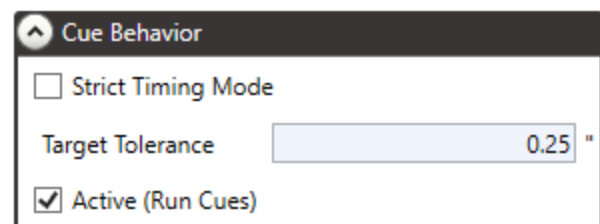


Spikes	
Add Spike Remove Spike	
Name	Value
OFF SL	-300 "
Mid SL	-120 "
Center Stage	0 "
Mid SR	120 "
SR Open	205.43 "
SR Closed	229.31 "

CUE BEHAVIOR

Most of the time, cues will automatically operate how you want, but occasionally there are a couple different options to explore.

- **Strict Timing Mode** - Strict Timing mode insists that the motor moves accurately and achieves the cue position within the theoretical time allowed for that movement based on the programmed distance, speed, and acceleration. If the motor cannot achieve the target in the computed time, it will be turned off regardless of its current position.
- **Target Tolerance** - Spikemark will not register the move as complete until the location is within the Target Tolerance.



Cue Behavior

☐ Strict Timing Mode

Target Tolerance

☒ Active (Run Cues)

- **Active (Run Cues)** - This indicates whether the motor is able to move or not. When a motor is deactivated - uncheck Active (Run Cues) - it goes to sleep, disallowing any movement of that motor only. Cues and links will still load and run, but without that motor.

SCHEMATIC

Use the **Schematic** tab to effectively use the Stage Model Viewer as a simulation tool. It will allow you to recreate the approximate outline of the unit being moved, and mimic its motion as well. Note that all dimensions are in feet, regardless of your motor unit.

Schematic

All dimensions are in feet.

Distance from Center 0'

Distance from Plaster 0'

Elevation from stage 0'

Width 4'

Length 8'

Height 0.5'

Rotation X 0°

Rotation Y 0°

Rotation Z 0°

Sides (Periaktes Only) 3

☒ winch
☐ turntable
☐ periaktes

☒ Clockwise Rotation Positive

ADVANCED

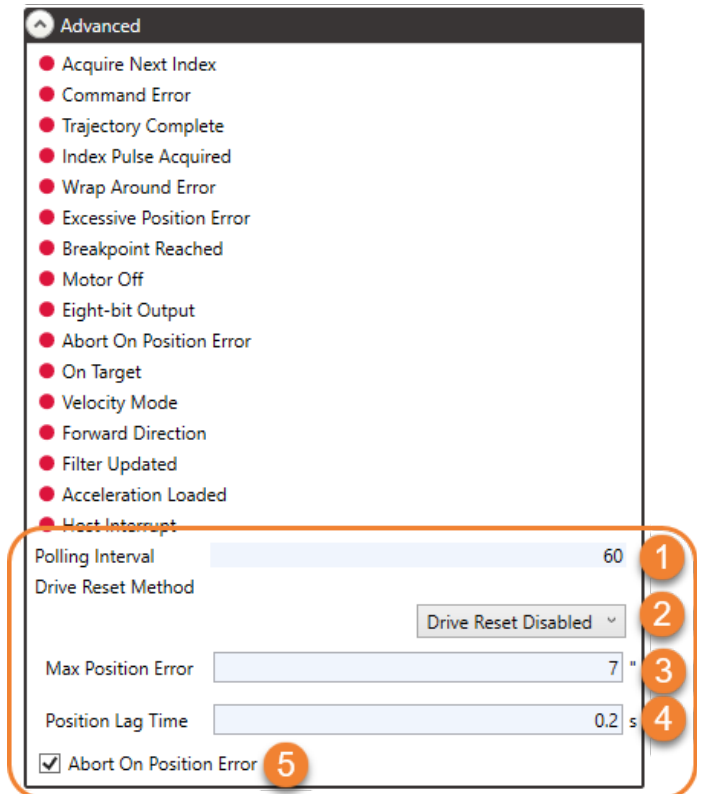
There are really only a couple reasons that a typical Spikemark user would need the **Advanced** tab, and these events are also typically when something isn't going quite to plan. Let's go over the sections you, as the Spikemark programmer and operator, will need to know.

1. **Polling Interval** - Spikemark polls the Stagehand for updates at a given interval - which is this value in milliseconds. These updates include position data and limit states.

The default Polling Interval is 60 milliseconds or 0.06 seconds. The typical PC only can only function as fast as about 25ms, so any lower setting doesn't really do anything.

2. **Drive Reset Method** - For 99% of Spikemark users, this function is useless, but occasionally Spikemark is talking with a drive that requires a "manual" reset signal for certain drive occurrences or faults.

- a. **Strobe Aux Output 2** is used to reset several Mitsubishi Servo amplifiers.



3. **Max Position Error** - Throughout a cue, Spikemark is constantly calculating where a machine is supposed to be, and comparing that number to where the machine is in reality. If that discrepancy becomes larger than the Max Position Error, Spikemark will stop that motor and indicate a Position Error. The smaller the MPE, the more accurate the motion - which often requires better PID tuning.
4. **Position Lag Time** - While Max Position Error is a distance difference, Position Lag Time essentially creates a Max Position Error as a function of time and speed of a cue. The default is 0.2 seconds, though this can cause Abort on Position error faults on slower cues. Increase this value to reduce faults on slow cues.

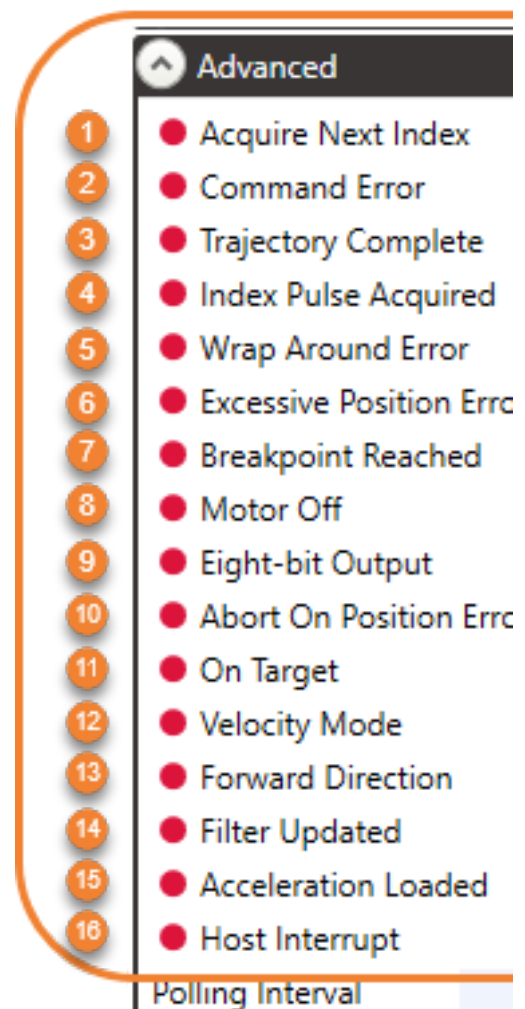
With the default value, Spikemark will calculate where the motor will be in 0.2 seconds from any given point at the desired cue speed. At 36 inches per second, a motor will theoretically travel 7.2 inches in 0.2 seconds. This is a calculated Max Position Error that is compared with the user input Max Position Error, and Spikemark will use whichever value is lower.

- 5. Abort On Position Error** - If this is selected, Spikemark will use the smaller of the numbers as discussed above to stop the motion of a motor when the Max Position Error has been exceeded. Deselect this and the move will continue, regardless of how far off it may be, until Spikemark receives feedback that the motor is located within the Target Tolerance of the target destination. It is important to note that if you are having an encoder issue, turning off Abort On Position Error could result in a motor that increases speed until you e-stop the machine.

You may be wondering if I only need to know these 5 advanced settings, what are the other 16 pieces of information in the Advanced tab? These indicators give us status information about the card inside the Stagehand. For the most part, these indicators are only helpful to those who are developing Spikemark here at Creative Conners, Inc.

We do not use a majority of these modes, but we find it helpful for finding issues in Spikemark before releasing new versions of Spikemark. However, let's go over briefly what each of these indicators tell us and how they may be helpful for you.

- 1. Acquire Next Index** - This is not a feature that is used with Creative Conners, Inc. equipment. This status should always show Red.
- 2. Command Error** - This indicator should always be Red. This indicator will go Green if Spikemark tries to write to the Stagehand card when the Stagehand card expects Spikemark to read from the card or vise-versa. However, this should never be the cause for the Stagehand to not allow motion.
- 3. Trajectory Complete** - This indicator can be the most confusing. The trajectory complete indicator turns Red when you give the Go command for a cue, and will turn Green after the expected time for the cue to complete has elapsed or you reach your desired position. Notice that for this indicator to change, you do not need both the position and the time allowed to change, but rather only one of these conditions needs to be met for the Trajectory Complete indicator to show Green.
- 4. Index Pulse Acquired** - This is not a feature that is used with Creative Conners, Inc equipment. This status should always show Red.
- 5. Wrap Around Error** - This indicator will go Green if you attempt to move beyond the maximum encoder count of 1,073,741,823. In order to achieve this with any Creative Conners, Inc equipment, you would need to run your machine at full speed for



many hours, even days. Almost impossible to achieve in most production applications, although we have seen it!

- 6. Excessive Position Error** - This status indicator should be Red and will turn Green when you reach the position error identified by the Max Position Error and Position Lag Time you have set. This will reset to Red when you load your next cue.
- 7. Breakpoint Reached** - This is not a feature that is used with Creative Conners, Inc equipment. This status should always show Red.
- 8. Motor Off** - Will turn Green when the motor drive output is turned off (i.e. e-stop, position error, soft stop, cue complete).
- 9. Eight-bit Output** - There are 2 different types of speed signal the Stagehand Card could output. Either we could use Eight-bit PWM output or Twelve-bit multiplexed output for speed control. We only use Eight-bit speed control for Creative Conners, Inc equipment. Since we are in Eight-bit mode, the indicator should always be Green.
- 10. Abort On Position Error** - This Status Indicator will be Green if you have Abort On Position Error checkbox Checked and will be Red if you have Abort On Position Error checkbox unchecked. This indicator will not update until you give the GO command for a cue.
- 11. On Target** - This indicator is very similar to Trajectory Complete. The On Target indicator turns Red when you give the Go command for a cue, and will turn Green after the expected time for the cue to complete has elapsed or you reach your desired position. Notice that for this indicator to change, you do not need both the position and the time allowed to change, but rather only one of these conditions needs to be met for the On Target indicator to show Green.
- 12. Velocity Mode** - There are 2 different types of motion that we could command with the Stagehand card. We only control motion with Position Mode. This indicator should always be Red to indicate that the Stagehand card is in Position Mode.
- 13. Forward Direction** - Forward Direction is only meaningful in Velocity Mode. Since we use Position Mode, this indicator should be Red.
- 14. Filter Updated** - This is not a feature that is used with Creative Conners, Inc equipment. This status should always show Red.
- 15. Acceleration Loaded** - When you load a cue in Spikemark, the acceleration is loaded into the Stagehand Card. This indicator should be Green when a cue or movement is loaded and return to Red once you give your GO command.
- 16. Host Interrupt** - In the Stagehand card, we have the ability to use two different methodologies to request information regarding motion. One is Host Interrupt that waits for status information with the Stagehand card to stop motion. The second option is where Spikemark polls information from the Stagehand card and then sends the appropriate command based on the response from the card. We use the polling option rather than the Host Interrupt option. Thus, if this status is ever Red instead of Green, the stagehand should be sent back to the factory for repair.

STAGEHAND MOTOR

You may notice that we use the terms Stagehand, Drive, Controller, Machine, and Motor somewhat interchangeably. That's because Spikemark doesn't care what Stagehand motion controller is connected - just that a device with one of our Stagehand Cards *is* connected. Additionally, Spikemark (much like the Stagehand) doesn't really care what the connected machine is. We can control induction motors, servos and even proportional valves all as "machines" from within Spikemark.

Motors are the primary "movers" of Stage Automation, almost every winch, hoist, or turntable out there is driven by a motor. In Spikemark, controlling a motor means we are telling the connected motor where to go, and how quickly. Additionally, Spikemark is expecting position feedback(via an encoder) and limit signals to send data back to the Stagehand and Spikemark. This tells us where we should expect the motor to be located in the physical space.

Below is a list of Stagehands you may encounter in the field:

- Stagehand Pro
- Smart Machine (Stagehand is built into the machine)
- Stagehand Apprentice
- Stagehand Hydraulic
- Stagehand Servo (Legacy)
- Stagehand AC (Legacy)
- Stagehand DC (Legacy)
- Stagehand Mini and Mini² (Legacy)

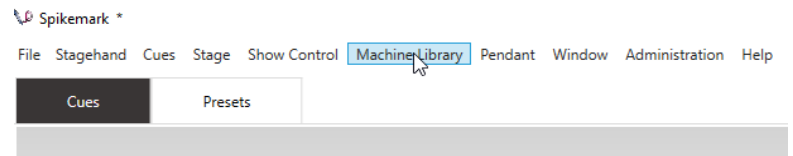
When Spikemark launches it opens the default show file. Unless changed, you will see a single axis - a Pushstick V2 winch - and one cue: Cue #1. Axes (the plural of Axis), will be found along the top of the cue grid and can be rearranged as needed. Though a single Pushstick is a great beginning to any show, it is likely you will need additional axes or to change the Pushstick to something else. An axis refers to any Machine, Stagehand controller or virtual Stagehand added to Spikemark.

There are several ways to add new axis to your show file:

- Drag and drop a pre-configured machine from the Machine Library
- Add a custom machine with the Add Motor command
- Import a Motor file.

ADD A MACHINE FROM THE MACHINE LIBRARY

1. Click the **Machine Library** menu.

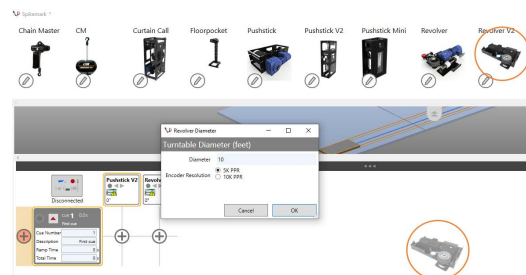


2. The Machine Library panel will slide down from the top of the main window.



3. Drag one of the machines from the Machine Library panel and drop it on either the **Stage Model Viewer** or the **Cue Grid**.

- a. When selecting a Revolver an additional window will appear asking for the diameter and encoder resolution.

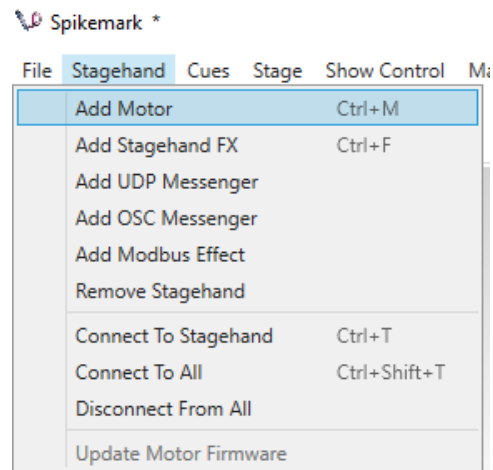


ADD A NEW BLANK MACHINE

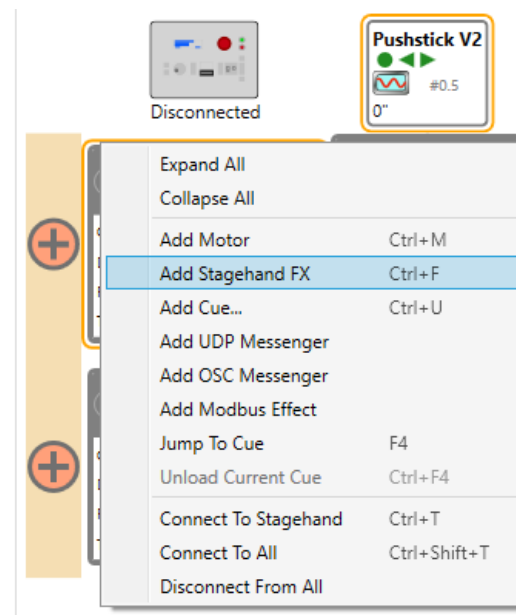
There are a couple of ways to add a new, blank machine to your show. This includes custom machines or motors, a Stagehand FX or third party Modbus Effect, or a Messenger, such as UDP or OSC.

1. From the **Stagehand** menu, select the desired Stagehand effect.

(Note: There are also quick key commands for adding a Custom Motor (Ctrl+M) and adding a Stagehand FX (Ctrl+F).)



2. Right-click on the **Cue Grid** to select the desired Stagehand effect from the list.



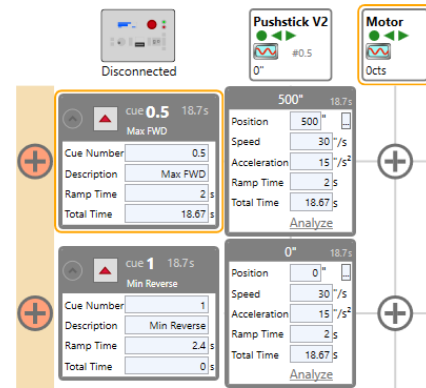
NOTE:

If you add a new blank Motor to the show, you will need to configure **Position Scale, Max Speed, Default Speed, Default Acceleration, and the PID Tuning** before trying to write cues. See [Configuring a Stagehand Motor](#) starting on pg. [] for details.

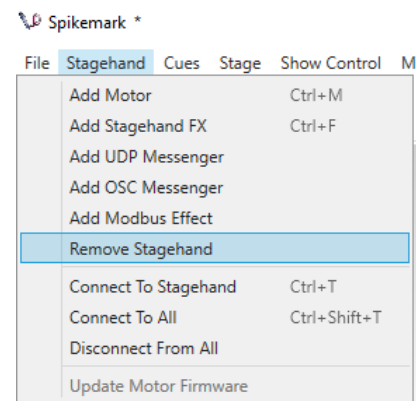
REMOVING A MACHINE FROM THE SHOW

It is good to know how to get rid of an axis from the show in case you add one by accident, or perhaps you find out that the automation budget has been cut before you start tech rehearsal. There are two ways to remove a Stagehand from the show.

1. Select the machine by clicking on it in either the **Cue Grid** or the **Stage Model Viewer**. The selected machine is highlighted in yellow. "Motor" is selected here.

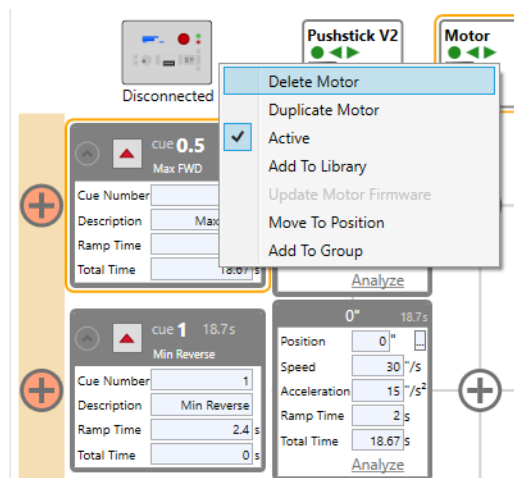


2. With the machine that you wish to remove selected, choose Remove Stagehand from the **Stagehand** Menu.



-OR-

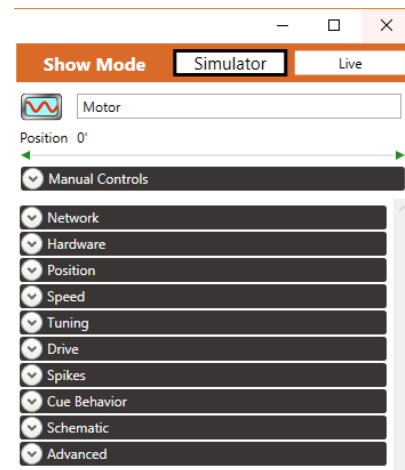
3. Right-click on the **Cue Grid** header of the machine you wish to remove, and select Delete [machine name] from the pop-up menu.



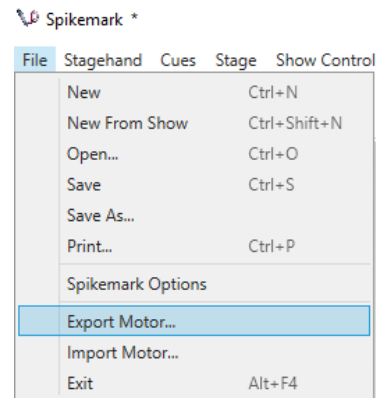
EXPORTING A MOTOR

If you have a custom motor that you frequently use, you can easily use the **Export Motor** function to save all of the settings in the **Stagehand Properties Panel** for future use.

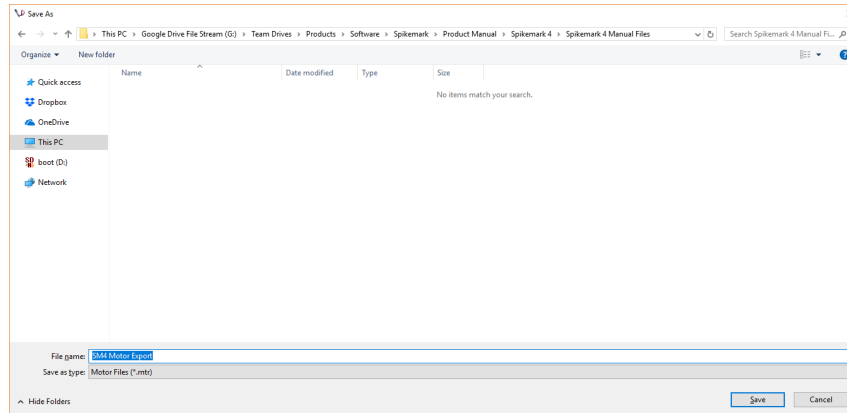
1. We'll go into the details of all of the different Stagehand Properties later, but before you export a motor, verify that all of the information is correct.



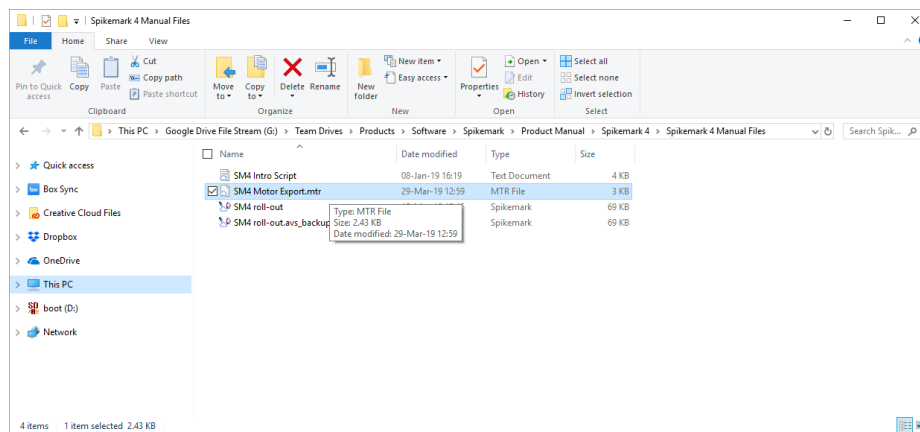
2. Click on **File** in the Menu Bar and select 'Export Motor...' to open a Windows Explorer "Save As" window.



3. Navigate to the location you would like to save your motor.

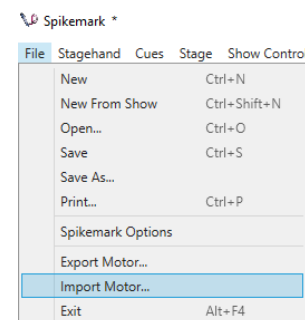


4. Click Save. You should now be able to locate your (.mtr) file in Windows.

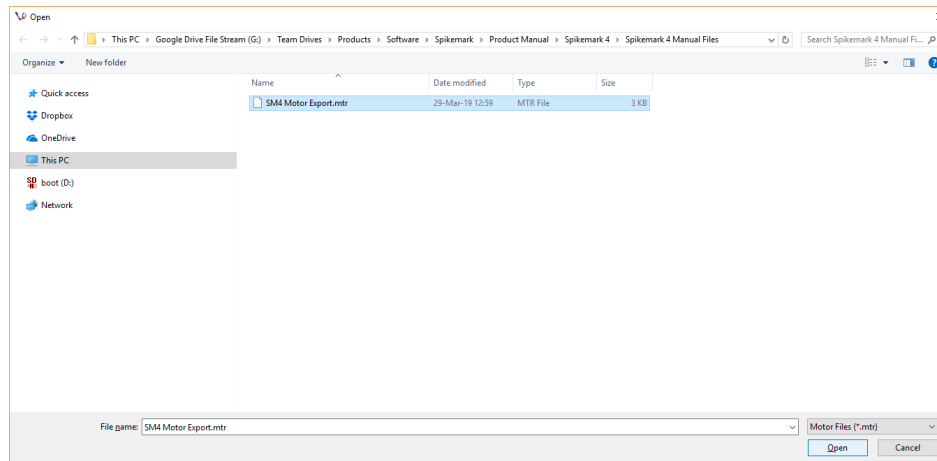


IMPORTING A CUSTOM MOTOR FILE

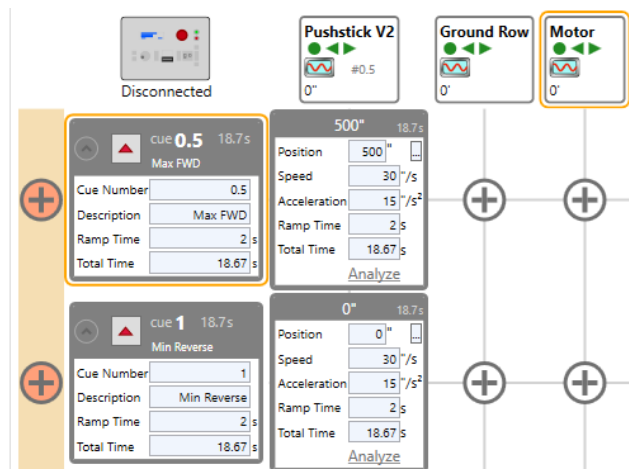
1. Click on **File** in the Menu Bar and select 'Import Motor...'



2. In the pop-up Windows Explorer window, navigate to where your exported motor file (.mtr) is located. Select your file and click Open.



3. Your motor will appear in Cue Grid as “Motor” regardless of the name when it was exported.



STAGEHAND MOTOR CONFIGURATION

Now is a great time for us to dig deep into the motor settings.

MOTOR NAME AND MOVEMENT

RENAMING A MOTOR

To help you identify all the motors in your show, you can give each motor a name. Typically, motor names reflect the purpose of the motor and will make writing cues more intuitive. For even better show continuity, use the unit name given by the design team or stage management.

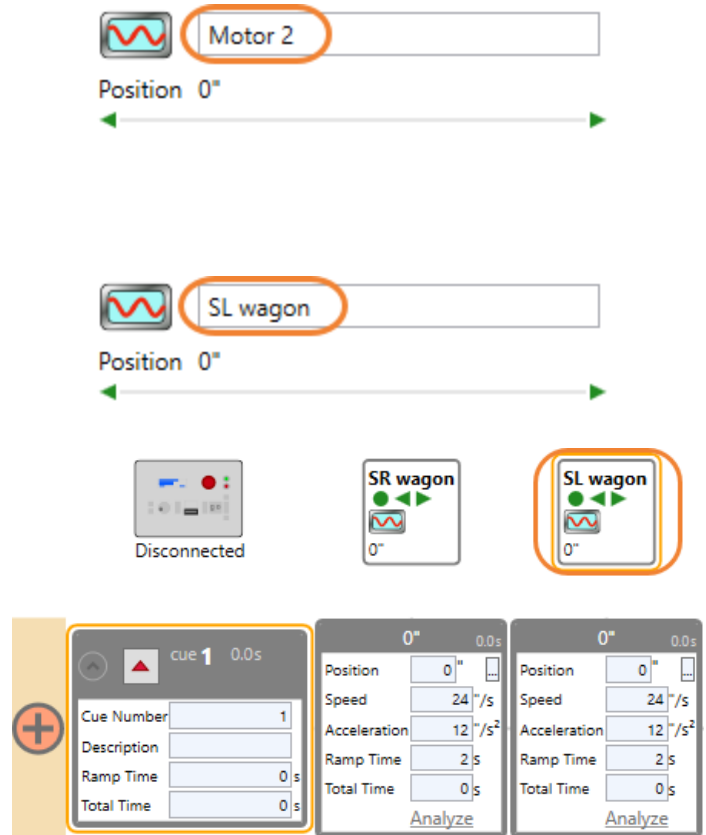
1. Select the motor to be edited in the **Cue Grid** and then click into the field in the **Stagehand Properties Panel** that contains the default motor name.

In the example below, the default name is "Motor 2".

2. Type a new name.

In the example below, the new name is "SL Wagon".

3. Press the Tab key or click out of the field to update the name. The new motor name will be updated in the Cue Grid.



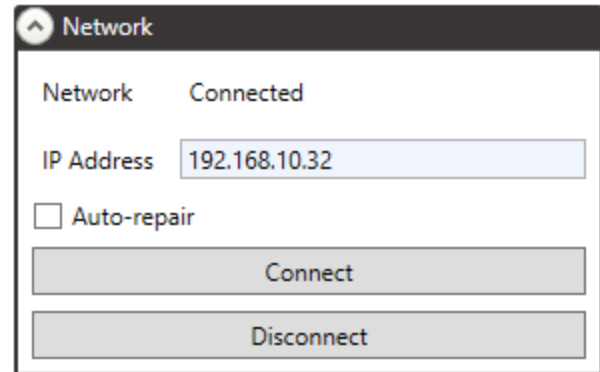
MANUALLY MOVING A MOTOR USING THE ON-SCREEN CONTROLS

You will frequently need to move a motor forward or backward without running a cue. During initial setup, tech, and work calls, the scenery often needs to be nudged around the stage. You can either run the motor using the physical jog buttons on the Stagehand, or you can use Spikemark's on-screen Manual Controls to move the motor, as described in the steps below.

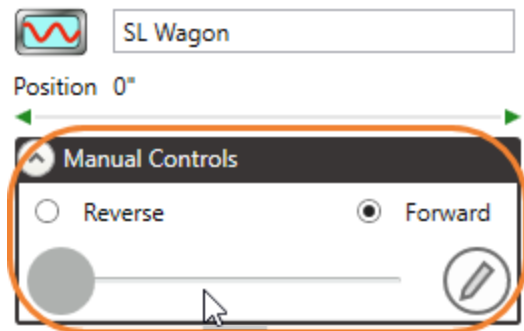
1. Select the motor you wish to move in the **Cue Grid**.



2. Confirm that the motor is connected to the network. If it's not connected, establish a network connection (see "Setting Up a Network Connection" on page 4).

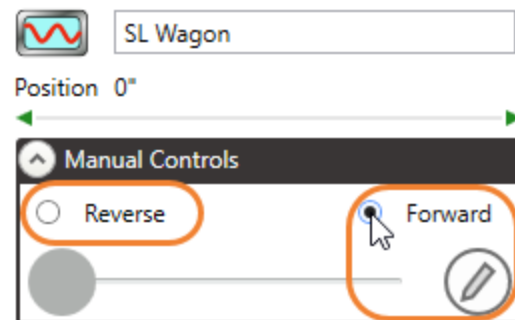


3. In the **Stagehand Properties Panel** on the right side of the screen, locate the **Manual Controls** section.

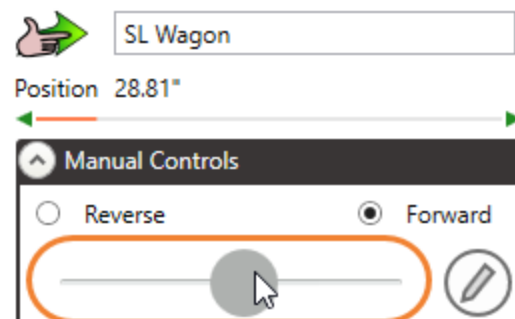


4. Select a direction, either Forward or Reverse.

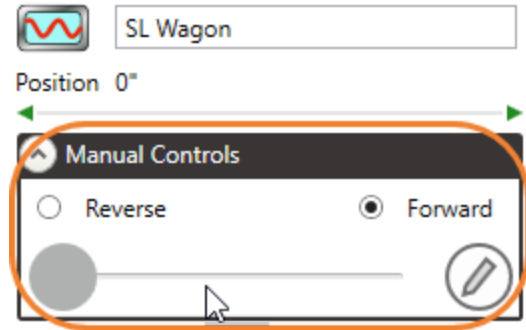
(Note: You can customize the direction labels by pressing the pencil-icon button.)



5. Click and drag the slider slowly to the right, which will release the brake and ramp up the motor speed.



6. To stop the motor, smoothly move the slider to the left and then release the mouse button. The motor will stop and the brake will engage.



NOTE #1:

- While manually jogging a motor in the **Forward** direction, the encoder counts must be increasing.
- While manually jogging the motor in the **Reverse** direction, the encoder counts must be decreasing.
- If this is **NOT** the case, you should correct the wiring by swapping the **A** encoder wire with the **B** encoder wire and swapping the **/A** encoder wire with the **/B**.

NOTE #2:

- While manually jogging a motor forward, if the machinery is traveling in the wrong direction (*for example, you want a piece moving forward Onstage, but it's moving Offstage*) and the encoder counts are decreasing, then you need to alter the actual motor wiring.

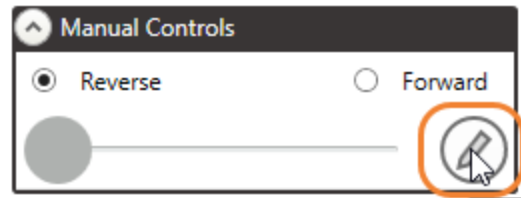
EDITING MOTOR DIRECTION LABELS

Knowing Forward and Reverse motion is very helpful in initial setup and when troubleshooting, but for an operator it is sometimes beneficial to make these more descriptive. For instance, deck winch labels may be clearer as "Onstage" and "Offstage" or "Stage Left" and "Stage Right."

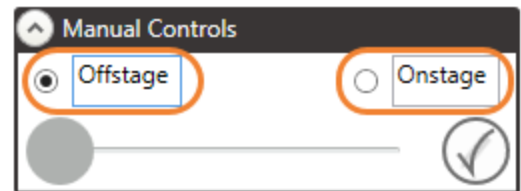
1. Select the machine you wish to edit in the **Cue Grid** or **Stage Model Viewer**.



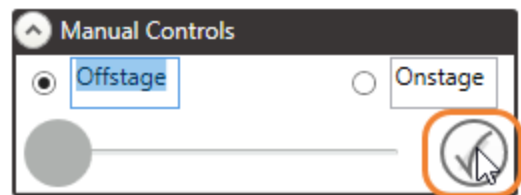
2. Click the Edit button in the **Manual Controls** section of the **Stagehand Properties Panel**.



3. Enter the new names for the direction labels.



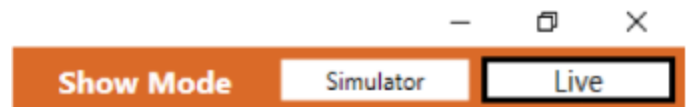
4. Click the Edit button again to accept the changes.



NETWORK CONFIGURATION

Spikemark communicates with the Stagehand through a network connection. Once the computer network is set up properly for Spikemark, you need to configure each individual Stagehand.

1. With Spikemark Open, select **Live** from the **Show Mode** switch.

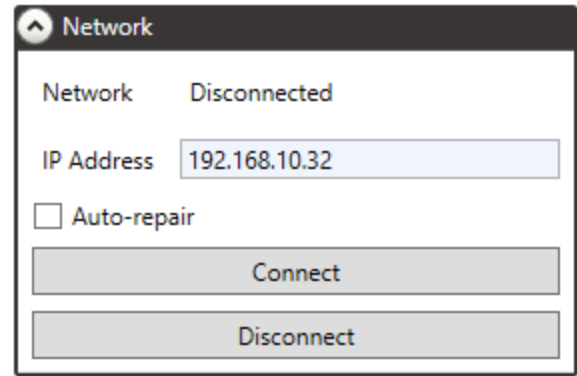


2. Select the axis you wish to connect to by clicking on it in the **Cue Grid**. An orange highlight will appear around the selected motor.



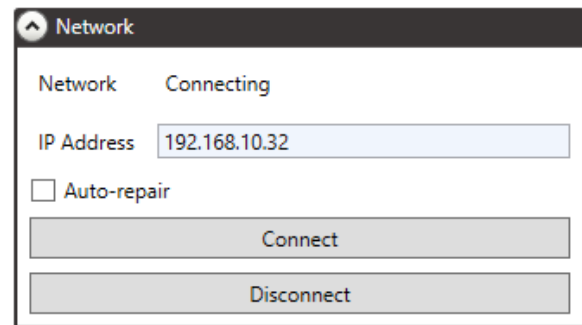
3. In the **Network** section of the **Stagehand Properties Panel** on the right side of the screen, enter the IP Address of your Stagehand and click Connect.

The IP Address for that Stagehand in Spikemark **MUST** match exactly the IP Address on that physical Stagehand. Each different Stagehand must have a unique IP Address.



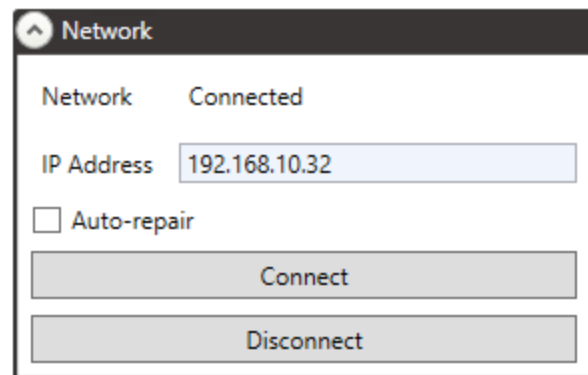
4. Once the Stagehand IP Address has been verified, click Connect.

You will see the Network status change to connecting, and the connection dot on the Stagehand Icon will either flash yellow and grey, or turn solid yellow as it attempts to connect.



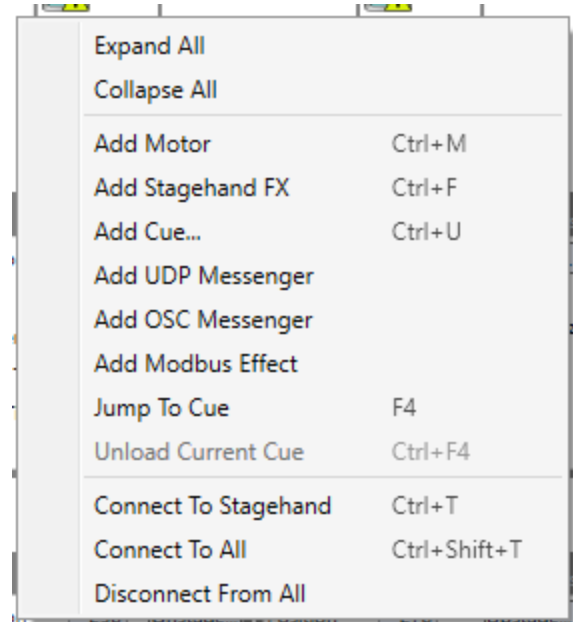
5. The Network status should then change from Disconnected to Connected.

If there's a network error, check your IP settings on the computer and Stagehand and then check your cabling.


























You can also connect to or disconnect from all Stagehands at once by right clicking in the white space on the Cue Grid and selecting Connect to All or Disconnect From All.

You can also use the key command Ctrl+Shift+T to attempt to connect to all Stagehands at once.



MOTOR STATUS

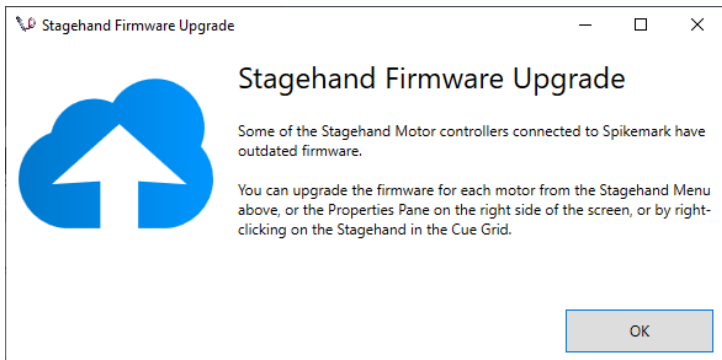
Motor status information is displayed next to the motor name in the Stagehand Properties Panel and in the Cue Grid column headers. Each icon status is described below.

Icon	Status	Icon	Status
	Motor disconnected from the network.		Running a cue forward in target-tolerance mode.
	Motor connected to the network, but idle.		Running a cue forward in strict-timing mode.
	Motor is inactive and won't run cues or affect cue links		Running a cue reverse in target-tolerance mode.
	Motor has completed a cue.		Running a cue reverse in strict-timing mode.
	Stopped because the motor drive has faulted. The drive should be reset and the error referenced in the drive's documentation.		Stopped by a forward limit switch on the motor.
	Emergency stop.		Stopped by a reverse limit switch on the motor
	Cue loaded.		Stopped by a position error fault.
	Soft stopping, but not yet fully stopped.		Brake fault indicating that one or both of the brake contactors is not operating correctly.
	Stopped mid-cue by a soft-stop command.		Stopped by an Ultimate Limit.
	In manual mode with the motor enabled, but zero-speed.		Stopped by a group fault.
	Moving forward in manual mode.		A firmware update is available.
	Moving reverse in manual mode.		

HARDWARE

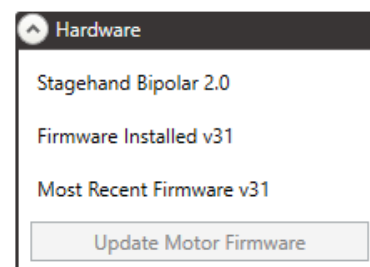
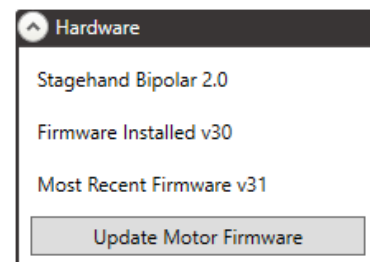
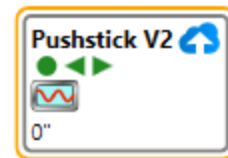
Spikemark is constantly growing and improving, even when your hardware might remain the same. We work diligently to ensure that there are very few legacy products that no longer function with Spikemark, but to maintain this backwards compatibility, it is critical that your Stagehand firmware is up to date and that you are running the most recent version of Spikemark.

Stagehand firmware updates are distributed through Spikemark. When a firmware update is available, you will see the Update Available icon. When you first connect to a Stagehand, a pop up window will also open notifying you of the update and asking if you would like to update now.



If you don't use this window, you can always come back to the Hardware tab to perform this update.

1. Select the motor your wish to update. Note that the Update Available status icon is in the upper right corner.
2. Navigate to the **Hardware** tab of the **Stagehand Properties Panel** and click Update Motor Firmware. This will begin the automatic update process. You may see a couple windows open as data is transferred, and then the Stagehand will automatically restart. The whole process usually only takes between 30 and 60 seconds.
3. Once the Stagehand has restarted, connect it to Spikemark following the steps above and check that the Firmware Installed matches Most Recent Firmware.



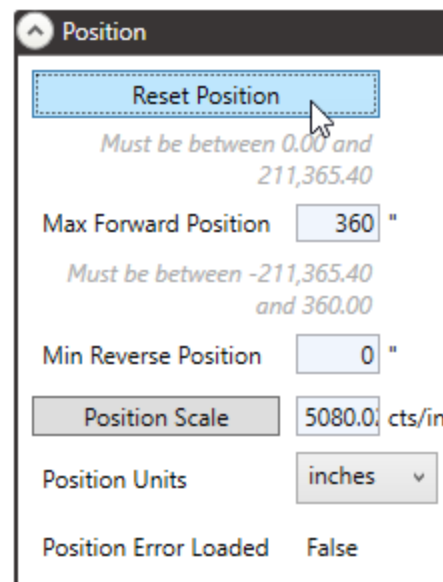
POSITION DETAILS

The position tab includes all the details about axis positioning. From here, you can reset position, change the Position Scale and set the soft limits for the selected axis.

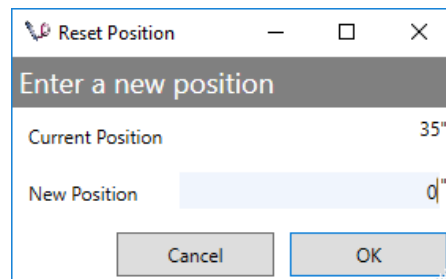
RESET POSITION

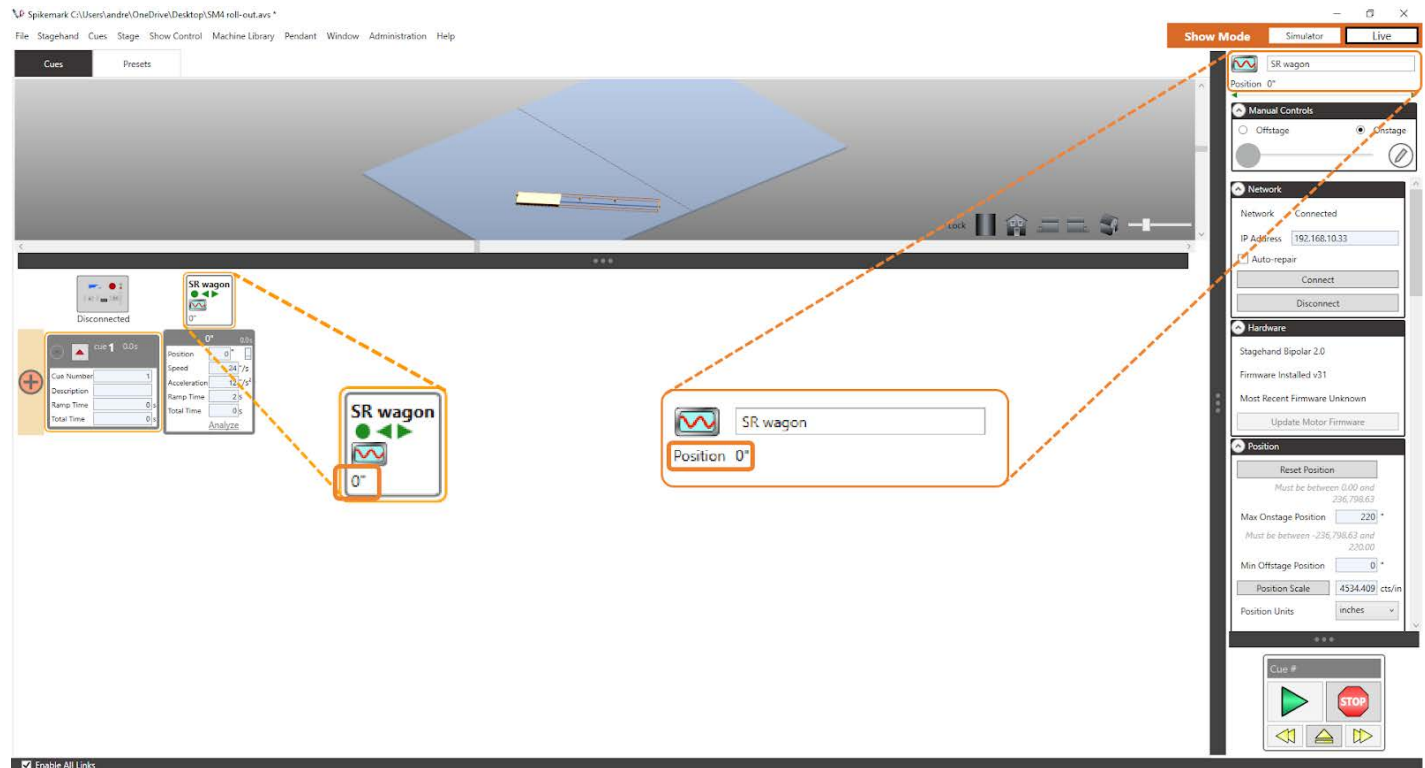
It is critical to set a known Home position - generally this is the “0” position, though it can be any position that makes sense for the axis in question. Whatever the position, it should be marked on the deck or a known position from a facility wall so it can be checked regularly and reset as necessary.

1. Manually jog the unit to its “home” position.
2. Place matching pieces of spike tape (match marks) on the stage and on the unit. This makes it easy to always come back to this location.
3. In Spikemark, go to the **Position** tab in the **Stagehand Properties Panel** and click Reset Position to open the Position Window.



4. Type in “0” (or whatever number you are using) and press OK. You will see the Current Position at the top of the Stagehand Properties Panel and on the motor icon on the Cue Grid read “0” and the model on the Stage Model Viewer will move back to its home position.





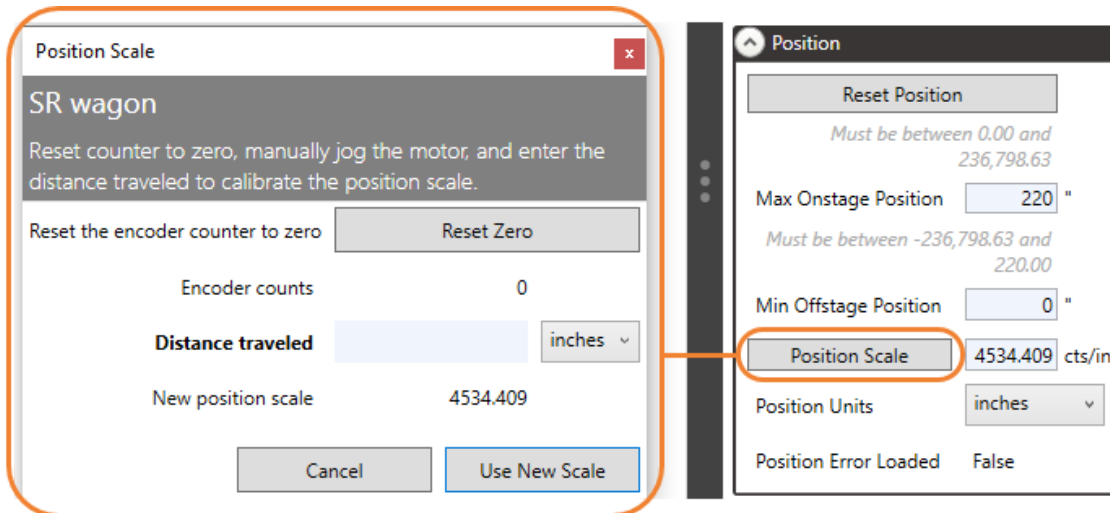
SCALING MOTOR POSITION

When a piece of scenery moves, an encoder connected to that scenery spins. As the encoder spins, it generates a stream of electrical pulses at a specific interval. The Stagehand connected to the encoder counts those pulses to determine where the scenery actually is. The Stagehand relays the position back to Spikemark, which then displays the position information on screen. By default, Spikemark displays the information as raw encoder counts. Viewing the position of the scenery as raw encoder counts is almost never ideal. Usually, you'll want to see the motor's position displayed in something more meaningful, such as inches or degrees.

Motor scaling allows you to specify a ratio between raw encoder counts and physical units. With a position scale defined, you can view the motor's current position and write cues in a more user-friendly manner. Spikemark can display position as inches, feet, millimeters, meters or degrees. Therefore, rather than having to type 1,245,120,295 encoder counts, you would simply enter 123.5 inches or 360 degrees.

USING THE POSITION SCALE WIZARD

Spikemark includes a great tool to set the position scale for you – the Position Scale Wizard.



To use the wizard:

1. Mark the position of the scenery.
2. Press the Reset Zero button to zero the position counter.
3. Run the scenery manually as far as safely possible.
4. Measure and enter the distance traveled as well as the desired measurement units.
5. Press the Use New Scale button.

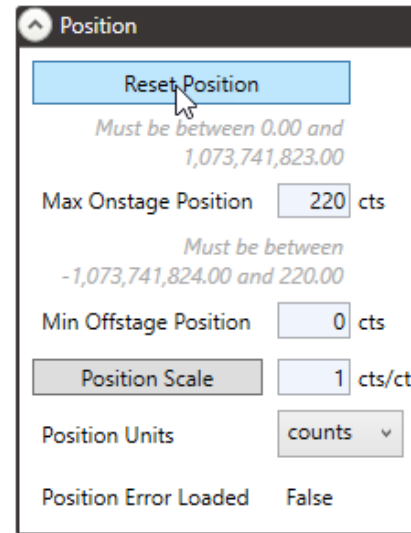
NOTE:

Sometimes your scenery will naturally want to be moved in reverse, giving you negative encoder counts. Since your Position Scale must be a positive number, the distance travelled must also be entered as negative. To do this, enter your distance travelled first, then use the left arrow key to go back and enter a “-” sign before the number.

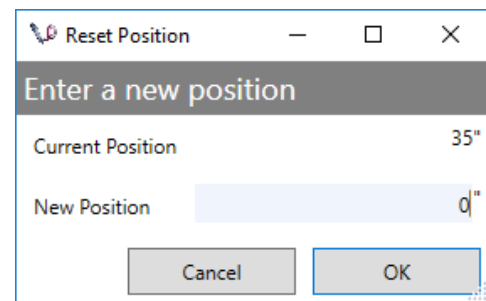
The wizard will calculate the position scale and place it into the configuration input field for the machine. This is a handy shortcut, and should be used whenever possible. However, it is possible to use a calculator to determine the scale.

CALCULATING POSITION SCALE FOR A WINCH

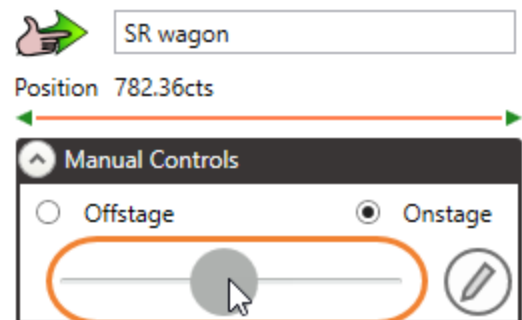
1. Confirm that the current Position Scale field is set to "1" in the **Position** section of the **Stagehand Properties Panel**.
2. Click the Reset Position button.



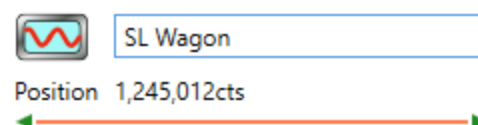
3. Enter "0" in the New Position field and click OK.



4. In the **Manual Controls** section of the **Stagehand Properties Panel**, run the motor forward or reverse as far as you safely can.



5. At the top of the Stagehand Properties Panel, note the number of encoder counts that are traveled.



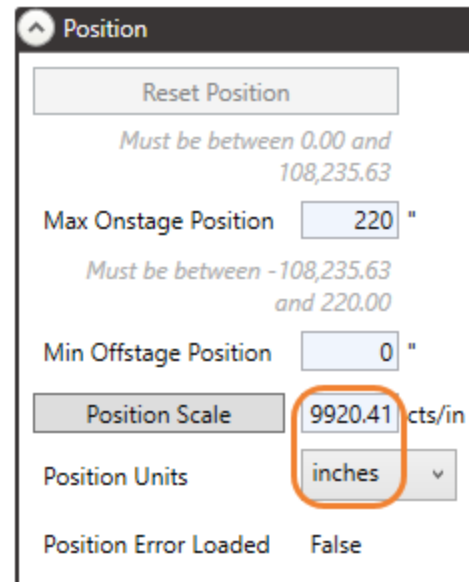
6. Measure the physical distance traveled by the scenery.

7. To compute the scaling factor, divide the number of encoder counts traveled by the physical distance.

For example: 1,245,012 encoder counts / 125.5 inches = 9,920.41 encoder counts per inch.

8. Enter the result from the previous step into the Position Scale field and then select the appropriate units from the Position Units drop-down menu.

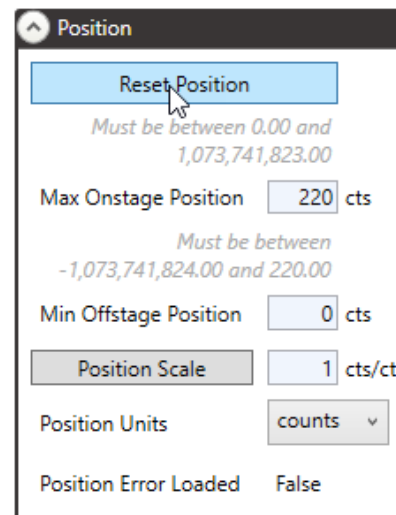
In this example, you would enter "9,920.41" and select "inches."



The screenshot shows the 'Position' configuration panel. At the top is a 'Reset Position' button. Below it, a range 'Must be between 0.00 and 108,235.63' is displayed. The 'Max Onstage Position' is set to 220. Below that, another range 'Must be between -108,235.63 and 220.00' is shown. The 'Min Offstage Position' is set to 0. The 'Position Scale' field is highlighted with an orange circle and contains the value 9920.41, with the unit 'cts/in' to its right. The 'Position Units' dropdown menu is also highlighted with an orange circle and shows 'inches' selected. At the bottom, 'Position Error Loaded' is set to 'False'.

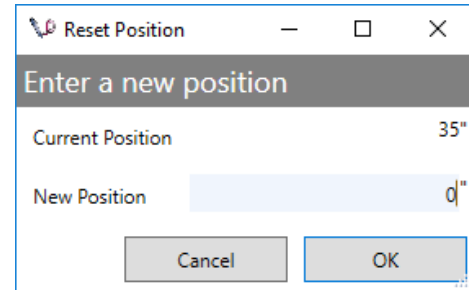
CALCULATING POSITION SCALE FOR A TURNTABLE

1. Confirm that the current Position Scale field is set to "1" in the **Position** section of the **Stagehand Properties Panel**.
2. Click the Reset Position button.



The screenshot shows the 'Position' configuration panel. At the top is a 'Reset Position' button, which is highlighted with a mouse cursor. Below it, a range 'Must be between 0.00 and 1,073,741,823.00' is displayed. The 'Max Onstage Position' is set to 220 cts. Below that, another range 'Must be between -1,073,741,824.00 and 220.00' is shown. The 'Min Offstage Position' is set to 0 cts. The 'Position Scale' field contains the value 1, with the unit 'cts/ct' to its right. The 'Position Units' dropdown menu shows 'counts' selected. At the bottom, 'Position Error Loaded' is set to 'False'.

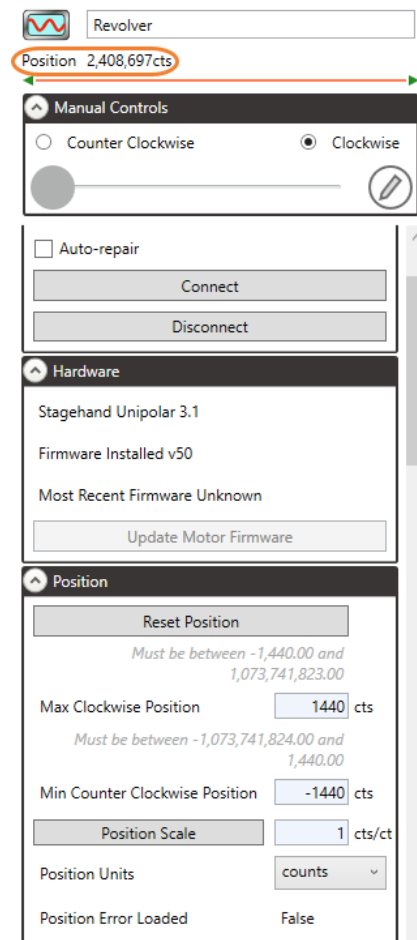
3. Enter “0” in the New Position field and click OK.



4. Place a piece of spike tape on the turntable deck and a matching piece of spike tape on the stage floor so you can register the turntable’s “0” position.
5. Assuming you can run the turntable indefinitely in either direction, use the **Manual Controls** in the **Stagehand Properties Panel** to run the turntable at four (4) complete revolutions in the Clockwise (or Forward) direction.
6. Slow down and stop the turntable so that the spike tape marks you made in Step 4 line up.
7. Compute your position scale by dividing the number of encoder counts traveled by 1440 degrees.

In our example:

$2,408,697 \text{ counts} / 1440 \text{ degrees} = 1672.94016 \text{ counts/degree.}$



8. Enter the Position Scale and change the Position Units to degrees. Notice that the Position value updates to 1440 degrees.

The screenshot shows the Spikemark 4 software interface. At the top, there is a 'Revolver' section with a 'Position' field set to '1,440°'. Below this is the 'Manual Controls' section with 'Counter Clockwise' and 'Clockwise' radio buttons, and a 'Connect' button. The 'Hardware' section shows 'Stagehand Unipolar 3.1' and 'Firmware Installed v50'. The 'Position' section is highlighted with an orange box and contains the following fields: 'Reset Position' (button), 'Max Clockwise Position' (1440), 'Min Counter Clockwise Position' (-1440), 'Position Scale' (1672.94016 cts/°), 'Position Units' (degrees), and 'Position Error Loaded' (False). The 'Position Scale' and 'Position Units' fields are highlighted with an orange box.

SETTING THE SOFTWARE LIMITS: THE MIN REVERSE AND MAX FORWARD POSITIONS

Software Limits - or Soft Limits - are available on any Stagehand Motor controller. You set the Maximum Forward Position and Minimum Reverse Positions each time the machine is installed. These two values describe the maximum travel available during cued motion. Soft limits are based on the encoder position and where Spikemark believes the machine to be. Be aware that you will be able to manually jog a machine outside of the soft limits, so it is always important to also set the hard limits mounted to the machine.

The minimum Reverse Soft Limit is generally set to 0 for a deck winch or hoist, and often set to a large negative value for turntables. It is important to manually jog your machine no matter the type to the soft limits prior to cueing motion.

Let's begin with setting the Minimum Reverse Position - this is how far the machine can travel in Reverse. It may help if you imagine you are setting up a deck winch and you have already reset position to 0 in the most off-stage position it can safely travel.

1. Confirm the current position is displaying “0”.
2. Place a piece of spike tape on the stage floor to mark the scenery’s physical position at the “0” location.

3. In the **Position** section of the **Stagehand Properties Panel**, enter “0” for the Min Rev Position. Followed by pressing Tab or clicking in the blank white space to confirm the number.

This will prevent you from accidentally writing cues less than 0.

Position

Reset Position

Must be between 0.00 and 236,798.63

Max Forward Position 220 "

Must be between -236,798.63 and 220.00

Min Reverse Position 0 "

Position Scale 4534.4 cts/in

Position Units inches

Position Error Loaded False

4. Using the **Manual Controls** in the **Stagehand Properties Panel**, drive the motor in the Forward direction until it travels as far as you feel comfortable, or just shy of the maximum travel.

Position 402.19"

Manual Controls

☐ Reverse ☒ Forward

Slider control with a red line indicating position.

5. In the **Position** section of the **Stagehand Properties Panel**, enter the current motor position as the Max Fwd Position, which will prevent you from writing cues greater than the current motor position.

Position

Reset Position

Must be between 0.00 and 236,798.63

Max Forward Position 220 "

Must be between -236,798.63 and 220.00

Min Reverse Position 0 "

Position Scale 4534.4 cts/in

Position Units inches

Position Error Loaded False

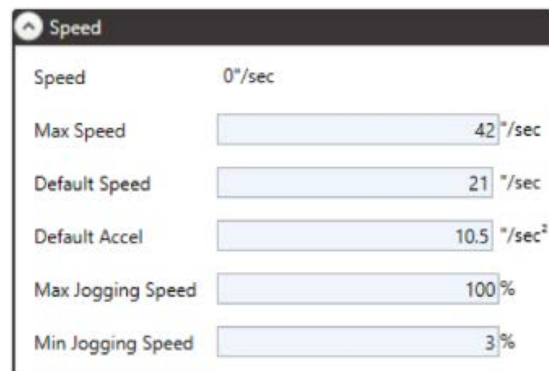
DETERMINING MOTOR SPEED

MAX SPEED

If you're using one of Creative Conners' stock machines, the Max Speed has already been tested and set. If you're using your own machine, this process can be done by yourself, but it is much easier and safer if you have a second set of eyes.

1. Navigate to the **Speed** section of the **Stagehand Properties Panel**.

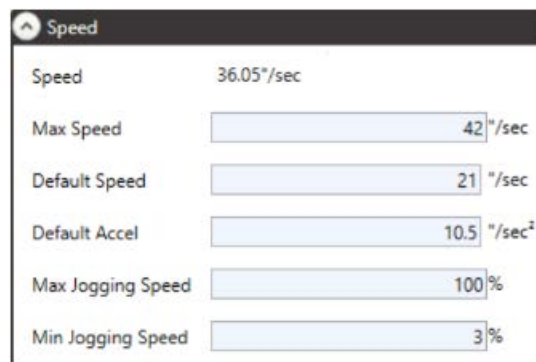
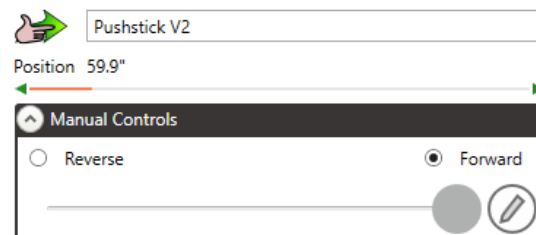
At the very top it shows Speed 0"/Sec (*this example shows inches, but whatever unit you used for the Position Scale will also show up here*).



2. Verify the full required travel path is clear for the unit.
3. While watching the Speed section, smoothly slide the Manual Jog Slider until it is at 100% (or use the jogging controls on the Stagehand face). Look at what speed is being indicated in the Speed section of the Stagehand Properties Panel.

Depending on encoder sensitivity, you may see the number flicker. It's best to use the smaller of these numbers, or if there is a large discrepancy between the flickering numbers, use a number slightly lower than the highest.

If you are getting help from a friend, it is best practice to have the person controlling the unit watch the unit. Look for any obstructions, and know when you need to slow down and stop at the end of travel. Your friend will watch for the Speed in Spikemark.



4. Once you know the speed, type that into the Max Speed input field and press Tab or click in the white space on the **Cue Grid** to confirm the number.

In this example, we saw 36.05"/sec, so we set our Max Speed to 36"/sec, and also adjusted our Default Speed and Default Accel to a good general movement speed. This gives us room to increase the speed as the design team might (and typically will) request.

The screenshot shows a 'Speed' settings window with the following values:

- Speed: 0"/sec
- Max Speed: 36"/sec
- Default Speed: 30"/sec
- Default Accel: 15"/sec²
- Max Jogging Speed: 100%
- Min Jogging Speed: 3%

DEFAULT SPEED AND DEFAULT ACCEL

Default Speed and Default Accel are used as the initial values when a new movement is created on the Cue Grid for that particular unit, and they can be set only as fast as the Max Speed. These values are also used when moving to a Spike position from the Spikemark Pendant. These numbers are purely up to personal preference, but a good rule of thumb is to use a number that is $\frac{1}{3}$ to $\frac{3}{4}$ of your Max Speed for your Default Speed, and then $\frac{1}{4}$ to $\frac{1}{2}$ of your Default Speed for Default Accel. This will give you room to speed up as necessary with a smooth 2-4 second acceleration time (ramp time).

Example table of Default Speeds and Default Accels for 36"/s Max Speed.

Default Speed Ratio	Default Speed	Default Accel Ratio	Default Accel
1/3	12"/s	$\frac{1}{4}$ (4 seconds)	3"/s ²
		$\frac{1}{3}$ (3 seconds)	4"/s ²
		$\frac{1}{2}$ (2 seconds)	6"/s ²
1/2	18"/s	$\frac{1}{4}$ (4 seconds)	4.5"/s ²
		$\frac{1}{3}$ (3 seconds)	6"/s ²
		$\frac{1}{2}$ (2 seconds)	9"/s ²
2/3	24"/s	$\frac{1}{4}$ (4 seconds)	6"/s ²
		$\frac{1}{3}$ (3 seconds)	8"/s ²
		$\frac{1}{2}$ (2 seconds)	12"/s ²
3/4	27"/s	$\frac{1}{4}$ (4 seconds)	6.75"/s ²
		$\frac{1}{3}$ (3 seconds)	9"/s ²
		$\frac{1}{2}$ (2 seconds)	13.5"/s ²

MAX AND MIN JOGGING SPEEDS

While the Max and Default Speeds are specifically for controlling Cues, the Max Jogging Speed and Minimum Jog Speed are only for controlling the speeds for manual movements using the Manual Controls in Spikemark, the Showstopper 3 Console, or the Spikemark Pendant. Each setting is a percentage that will automatically scale all speed signals to be within the Minimum and Maximum values.

Let's say that when you are manually jogging from the Stagehand, you note that at full speed your unit is moving 36"/s. With your Max Jogging Speed set to 100%, if you jog from Spikemark, you will also achieve 36"/s. However, if you set Max Jogging Speed to 50%, Spikemark will automatically calculate 50% of your full speed 36"/s, so that at full control deflection (moving the slider bar completely to the right), your unit will only receive 50% of your full speed signal, which in this case is 18"/s. The default Max Jogging Speed for a new motor is 100%.

The same concept applies to the Minimum Jogging Speed. When set to 0%, Spikemark will begin to send speed signals at the minimum possible levels. Setting this to 3% will cause Spikemark to automatically calculate 3% of the Full Speed Signal, and send that as your slowest speed. This helps cleanup slow speed chatter and choppy motion when attempting to jog at super slow speeds. We've found that most drives work well down to 3%, so the Min Jogging Speed defaults to 3% for a new motor.

Minimum and Maximum jog speeds do not affect manual movement from the face of the Stagehand motion controller or cued motion.

MOTOR TUNING - LEARNING TO LOVE THE DARK ARTS

Motor tuning is perhaps the most difficult aspect of scenic automation. By tuning a motor, you are describing to a Stagehand how it should regulate the motor speed during a cue using mathematical formulae. We won't get too deep into the intricacies of that math, but it is hard to discuss motor tuning without getting a little involved in the nuts and bolts of motion control theory.

First, it helps to understand the problem that motor tuning solves. The best analogy for motor tuning is cruise control on a car. When you set your cruise control to 55 mph, the car has to adjust the amount of fuel going to the engine to keep moving at that speed. If you are going up hill, the car lags for a second and then more gas rushes into the engine and the car speeds up to get back to the desired speed. Similarly, the car needs to regulate the amount of gas when going down a hill.

Motion control for scenery is very similar. We program the Stagehands with a speed and target position, and the Stagehand has to adjust power to the motor to achieve the desired speed and target. If there's a bump in the floor, the winch has to have a little more power to maintain speed. If the winch has too much power, it will lurch over the bump and then quickly reduce power so that it doesn't go too fast once it is over the bump.

The Stagehand is constantly analyzing where the motor is versus where it should be and then adjusting motor power to minimize the difference between where the motor should be and where it

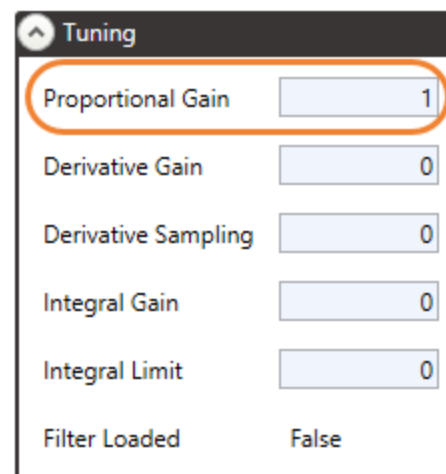
really is. It does this analysis a few million times per second. When it wants to apply power to correct for the error in position, it looks to us for guidance.

By entering in some tuning values, we are giving the Stagehand that guidance. In a confounding abstract way, we are specifying how much power to give the motor when it needs to make a correction. If the values that we enter gives the motor too much power during correction, the motor will be jerky as it over-corrects and then has to pull back (remember, this happens millions of times per second). If the values we enter do not provide enough power to the motor to correct position, it will never reach the cue's target position since it will run out of power and be unable to muscle the load onto the target.

There are five tuning values that can be used to achieve smooth, accurate motion. To adjust these values, select the motor you wish to tune in the **Cue Grid** and select the **Tuning** section in the **Stagehand Properties Panel**.

PROPORTIONAL GAIN

P-Gain is the ratio of power to position error. The higher this value, the more power will be applied to correct for position errors. This is often the only tuning value you will need to adjust. P-Gain needs to be at least "1" for the motor to move at all. If the value is too high, the motor will begin lurching. Sometimes this lurching can be extreme so make sure to have your hand on the Emergency Stop when you first adjust this value.



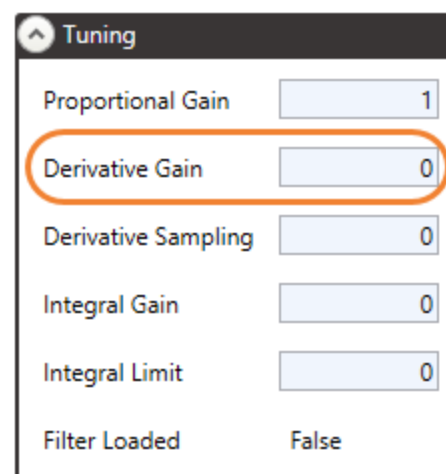
The screenshot shows the 'Tuning' panel with the following settings:

Parameter	Value
Proportional Gain	1
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	False

The 'Proportional Gain' field is highlighted with an orange circle.

DERIVATIVE GAIN

D-Gain is applied against changes in position error. It can have a dampening effect on a motor, absorbing the shocks from a high P-Gain. Typically apply at intervals of 100.



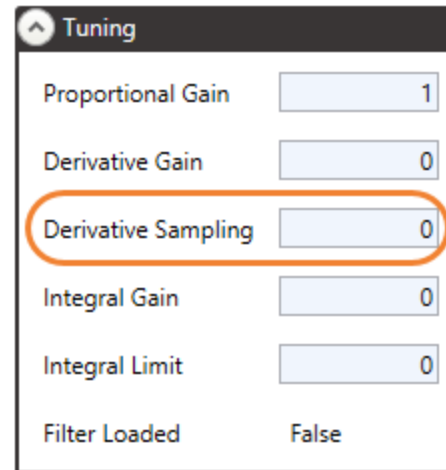
The screenshot shows the 'Tuning' panel with the following settings:

Parameter	Value
Proportional Gain	1
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	False

The 'Derivative Gain' field is highlighted with an orange circle.

DERIVATIVE SAMPLING

This describes how often the Derivative Gain should be applied. If you are using Derivative Gain, Derivative Sampling must be set to at least “1.” Rarely (but not never) is there any benefit to using a Derivative Sampling value higher than “2.”

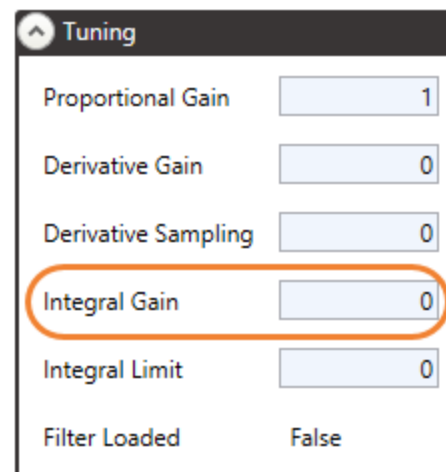


The screenshot shows the 'Tuning' panel with the following settings: Proportional Gain: 1, Derivative Gain: 0, Derivative Sampling: 0 (highlighted with an orange circle), Integral Gain: 0, Integral Limit: 0, and Filter Loaded: False.

Tuning	
Proportional Gain	1
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	False

INTEGRAL GAIN

I-Gain or Integral Term, tries to compute corrective action by evaluating the position error and motor response over time. From a practical standpoint, I-Gain will often correct the motor's position at the end of travel. This can be helpful if you need to reduce Proportional Gain to smooth out a motion, but then lose accuracy. In such a scenario, adding in 1 or 2 points of I-Gain will often retain accuracy without sacrificing smooth travel.

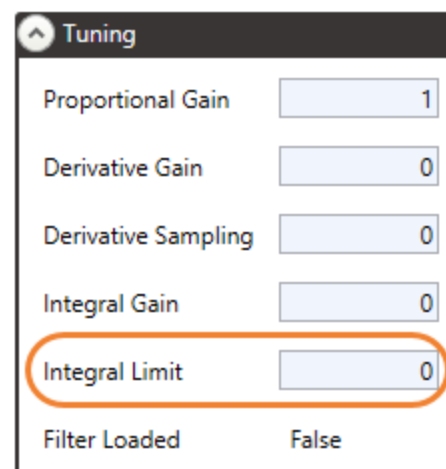


The screenshot shows the 'Tuning' panel with the following settings: Proportional Gain: 1, Derivative Gain: 0, Derivative Sampling: 0, Integral Gain: 0 (highlighted with an orange circle), Integral Limit: 0, and Filter Loaded: False.

Tuning	
Proportional Gain	1
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	False

INTEGRAL LIMIT

Integral Limit prevents a condition known as Integral Windup, which can lead to really erratic motor behavior. If you use an Integral Gain, set Integral Limit to 1000.

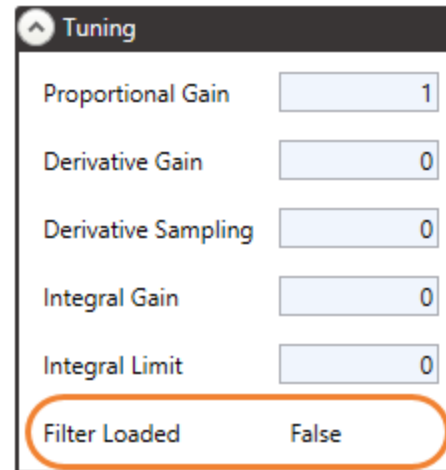


The screenshot shows the 'Tuning' panel with the following settings: Proportional Gain: 1, Derivative Gain: 0, Derivative Sampling: 0, Integral Gain: 0, Integral Limit: 0 (highlighted with an orange circle), and Filter Loaded: False.

Tuning	
Proportional Gain	1
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	False

FILTER LOADED

This is not an adjustable motor tuning value. Rather, it indicates whether the filter values have been sent to the motor yet. After you change a tuning value, that change is saved until the next cue is run. When the next cue is run, the new filter values will be sent to the motor automatically.



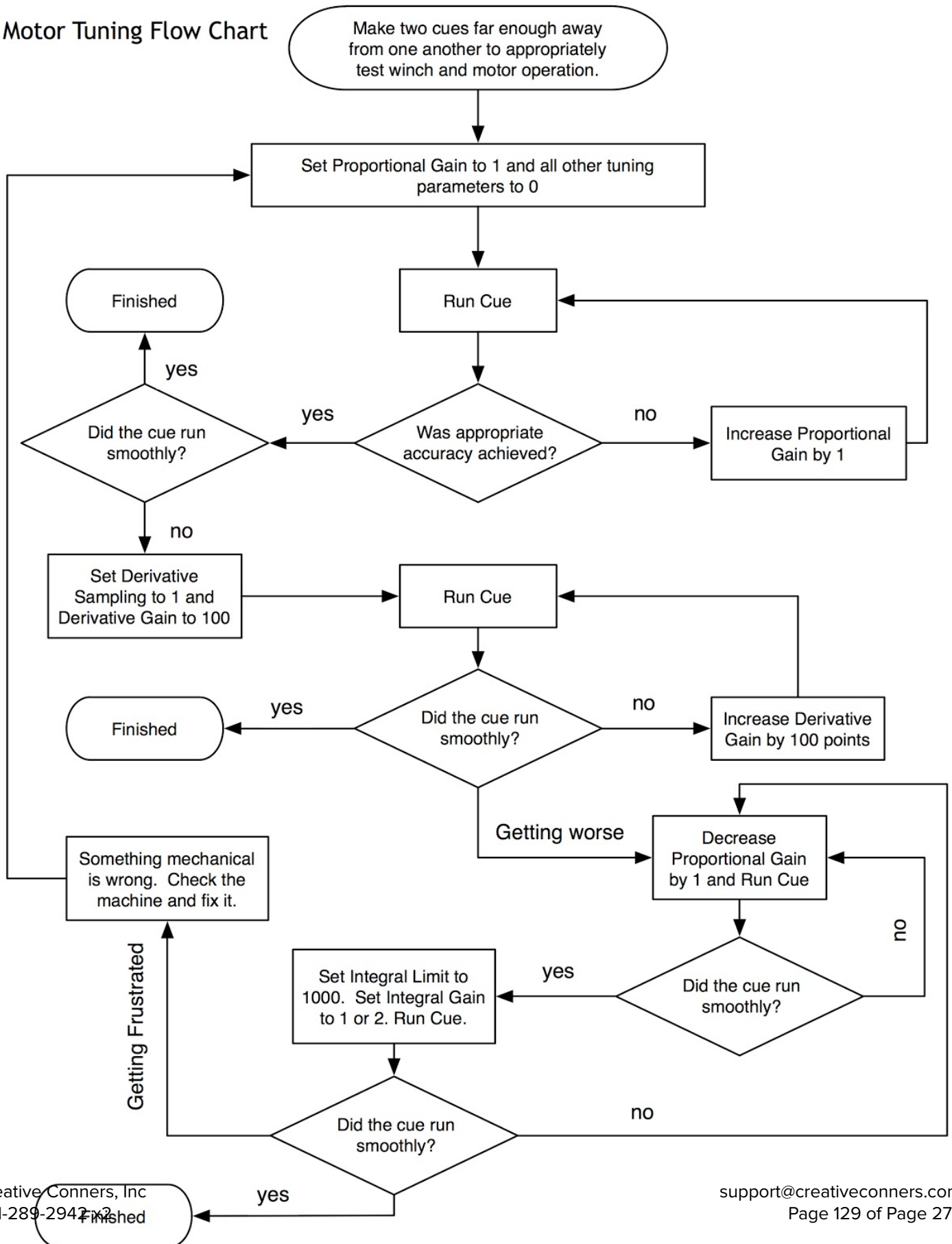
The screenshot shows a 'Tuning' window with a list of parameters and their values. The 'Filter Loaded' status is highlighted with an orange oval and shows the value 'False'.

Tuning	
Proportional Gain	1
Derivative Gain	0
Derivative Sampling	0
Integral Gain	0
Integral Limit	0
Filter Loaded	False

A PRACTICAL APPROACH TO THE DARK ARTS

Over the past several years, we've come up with a practical approach to motor tuning that yields good results in a reasonable amount of time. That approach is shown in the form of a flow chart. The steps are clear and simple, but it can still be a frustrating experience the first time you attempt to tune a motor. It's extremely important to find at least an hour of quiet time on the stage without anyone else working around the moving scenery. Get a cup of coffee, relax, focus and take a stab at it. If that doesn't work, give us a call at 401-289-2942 ext 2 - we have had plenty of experience helping people tune motors over the phone. The good news is that it gets a lot easier once you see it work the first time.

Motor Tuning Flow Chart



CUE BEHAVIOR

TARGET TOLERANCE

Target Tolerance mode makes motor cues more reliable regardless of poor tuning. When using Target Tolerance mode, the motor will continue to try to achieve the target position regardless of how much time has passed. Once the motor position is within the specified tolerance, it will turn off and display a Complete status icon.

STRICT TIMING

Strict Timing mode insists that the motor moves accurately and achieves the cue position within the theoretical time allowed for that movement based on the programmed distance, speed, and acceleration. If the motor cannot achieve the target in the computed time, it will be turned off, regardless of its current position, once the calculated cue time has passed.

NOTE:

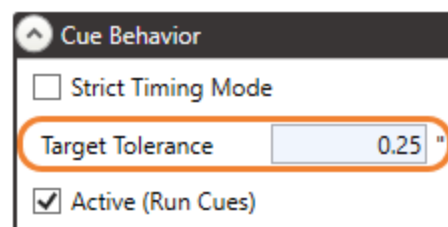
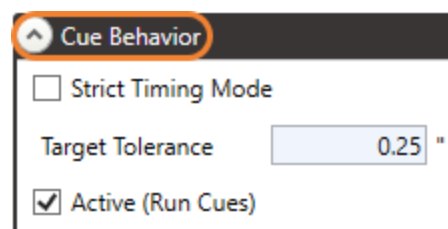
For shows that have tight timing requirements, this option may be useful. However, it has mostly been included in Spikemark since it was the only mode available in earlier versions of Spikemark. When using this mode, you have to be diligent about tuning your motors well. Sloppy tuning will result in motors abruptly stopping in mid-move.

1. To specify which cue completion mode to use, select the motor you wish to edit in the **Cue Grid**.

2. Scroll to the **Cue Behavior** section in the **Stagehand Properties Panel**.

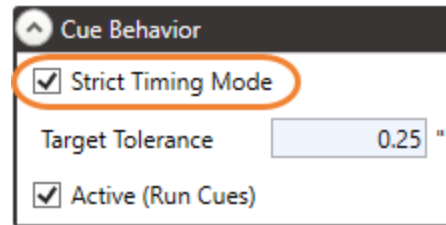
3. To use Target Tolerance mode, make sure that Strict Timing Mode is deselected and enter a Target Tolerance value, which is listed in scaled position units (for example, inches, degrees, etc.).

In the figure to the right, "0.25" equals 1/4 inch.



4. To use Strict Timing Mode, select the Strict Timing Mode field.

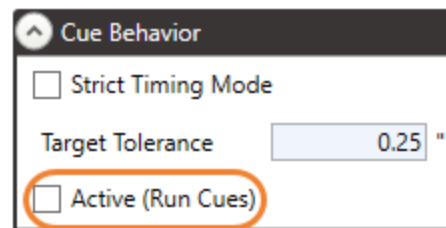
(Note: With Strict Timing Mode checked, the Target Tolerance value will be ignored.)



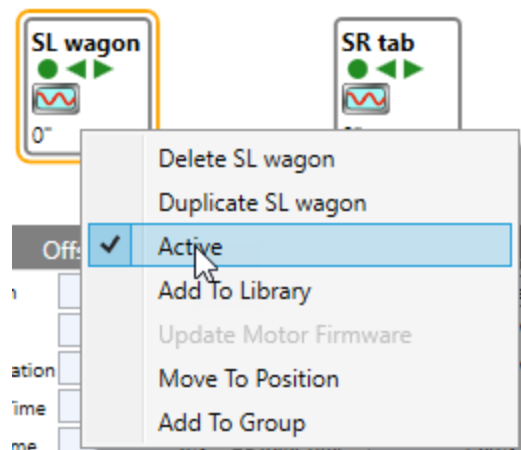
SETTING A MOTOR'S ACTIVE MODE

Most of the time, you will want the motor to load and run cues normally. However, there are occasions when a motor needs to be temporarily removed from the show. Perhaps there is a problem with the scenery on a winch track, or perhaps you need to run through movements using only the motors downstage and don't want any upstage motors to move.

To temporarily disable a motor, deselect the Active box in the **Cue Behavior** section of the **Stagehand Properties Panel**. The motor will not run cues until the Active box is checked again.



You can also set the Active mode by right-clicking on the **Cue Grid** header as shown.

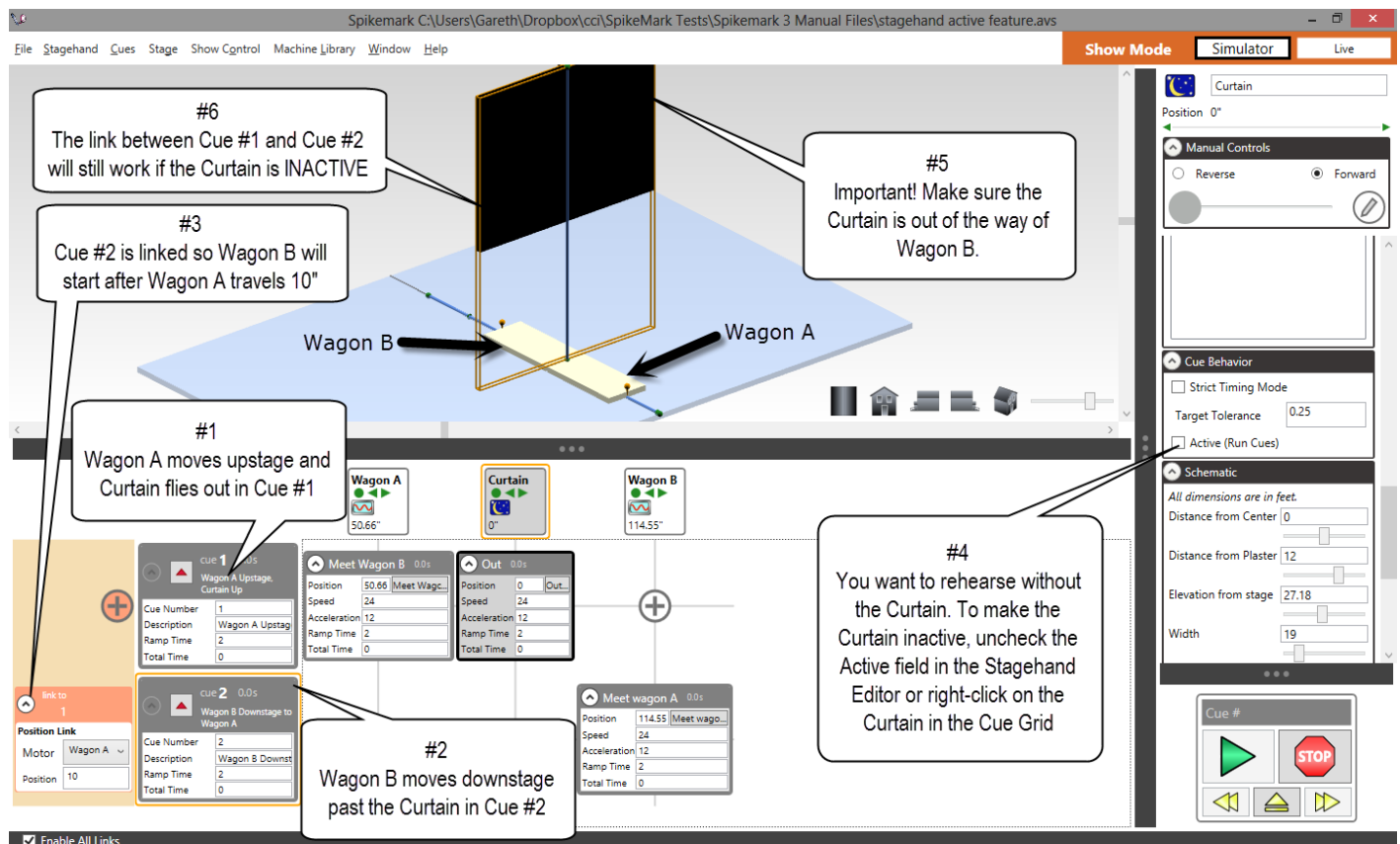


When a motor is deactivated (not Active), it will not impede the operation of cue links (see "Cue Links" on page --). Normally a cue needs to successfully load all motor movements before it can be executed by a cue link. However, if a motor within a cue is not Active and thereby unable to move, the entire cue will still be allowed to execute. Spikemark will trust that you have ascertained that it is safe for the cue link to run without this motor and you are overriding the normal requirement that all motors must be able to move before any motor will move in a linked-cue sequence.

EXAMPLE:

- 1: Assume you have written Cue 1, in which Wagon A moves upstage and a Curtain goes up.
- 2: Also assume you have written Cue 2, in which Wagon B moves downstage, past the Curtain and meets Wagon A.
- 3: Now assume that Cue 1 and Cue 2 are linked—by position—so that Wagon B starts moving once Wagon A has moved [for this example, 10"].
- 4: Lastly, assume that you want to rehearse without the Curtain.
- 5: To do this, you would fly the curtain up and make sure it is out of the way of WAGON B. Next, you would deactivate the Curtain [by deselecting the Active field in the **Cue Behavior** section of the curtain's **Stagehand Properties Panel**]. Then it would then be safe to test Wagon A and Wagon B, as you've moved the curtain up and out of the way of Wagon B
- 6: Deactivating a motor does not stop the links between cues. Therefore, the link between Cue 1 and Cue 2 will still work [in this example, Wagon B will start moving once Wagon A has reached the 10" mark].

See image below.



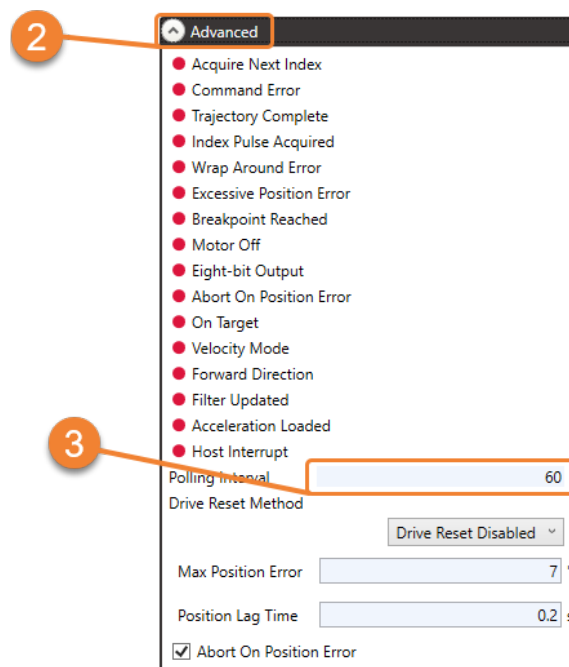
CHANGING THE STATUS REFRESH RATE

Whenever Spikemark connects to a motor, it starts asking the Stagehand for updated information about its status, position, limits, and Emergency Stop condition. Spikemark asks for updated information several times a second to give the illusion of a steady stream of information. This is how the position information appears to fluidly change as the motor moves on stage. Most of the time, this all works great and you don't have to think about *how* it works. However, if you have a large show, or a slow computer, you may find that Spikemark seems to be slowing down or feeling clunky.

In the case described above, you may wish to tweak the frequency of information updates, known as the Polling Interval, so that Spikemark doesn't get bogged down with this constant updating process.

1. Select the motor you wish to adjust in the **Cue Grid** or **Stage Model**.
2. Scroll to the **Advanced** section of the **Stagehand Properties Panel**.
3. Enter a new value in the Polling Interval field.

The values are in milliseconds. The default value is "60" which means that Spikemark updates motor information ~16 times per second. Setting the Polling Interval to "250" will update motor information 4 times a second, which will relieve the computer of some processing stress, but the updates on screen will appear jerky.

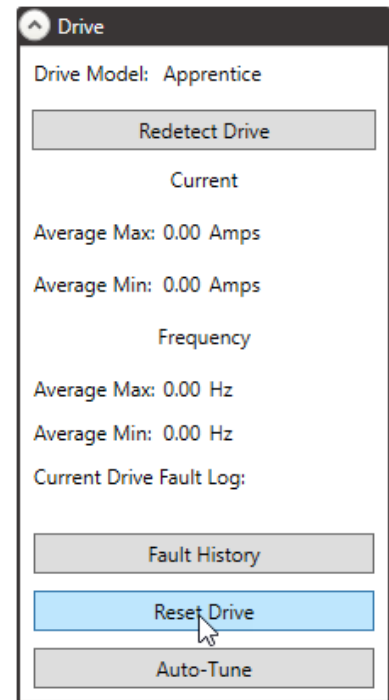


DRIVE RESET METHOD

On older Stagehand controllers, resetting the VFD occurs any time the E-Stop is engaged. On newer Stagehands and Smart Machines this is not the case.

When you see the Drive Fault icon you have three options to reset the fault:

1. **Emergency Stop** - This will reset any legacy Stagehand controller.
2. **Spikemark** - For Smart Machines and current Stagehand controllers, you can select “reset drive” from the Drive tab in the Stagehand Properties Pane.
3. **Power Cycle** - The tried and true reboot works for all Stagehands.



MOTION GROUPS

WHAT ARE GROUPS

A group is a collection of two or more motors that monitor each other's faults and stop if something is wrong. Each motor in a group creates a special connection to Spikemark that allows it to know if another motor in its group has experienced an issue so it can stop itself.

Grouped motion is not synchronized motion - it is possible to send motors to different targets in the same cue. This is a feature, not an oversight. Imagine a scenario where you have two motors picking a single truss and you want to make the truss tip up and down. You would want both motors to stop if it went outside its position path. For this reason, it is vitally important that motor tuning is as tight as possible when using group motion. Good tuning will maintain tight position tolerance throughout the cued motion.

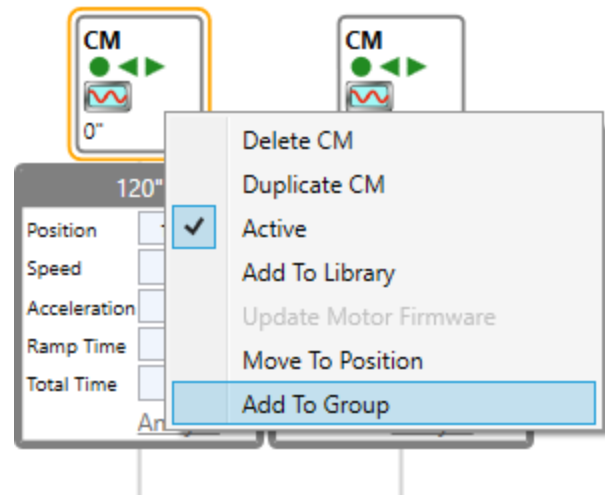
HOW IT WORKS

Each Stagehand in a group creates an additional connection to Spikemark. This connection is used solely for the purpose of communicating group status' and operates faster than the regular network connection. When jogging a group, running Move to Position, or running a cue, each Stagehand in the

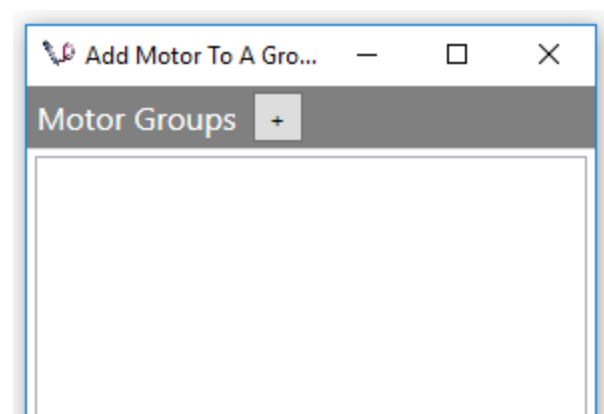
group will monitor this network connection and if it doesn't receive an "OK" status message every 100ms it will abort motion. Additionally, the Stagehand monitors its own position error and limit status' and aborts if any are tripped. The consequence of this is that if any of the limits on any of the grouped Stagehands is tripped, every motor in the group will not move. This behavior includes the scenario where an up limit is hit and the group tries to jog down. To recover from this, the offending Stagehand needs to be jogged independently off the limit before group motion will be restored.

CREATING A GROUP

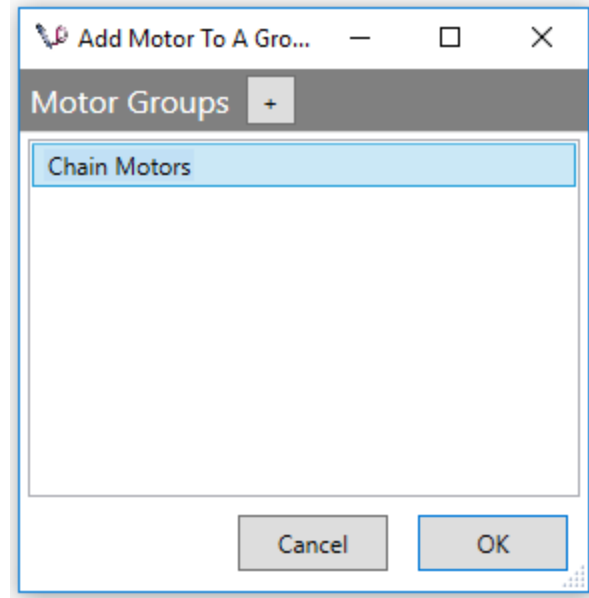
To create a group, right click a motor that wants to be added to a group and click Add To Group.



This will bring up the Motor Groups dialog. Listed here is every group in a show. To create a new one click the + (plus) button in the header.



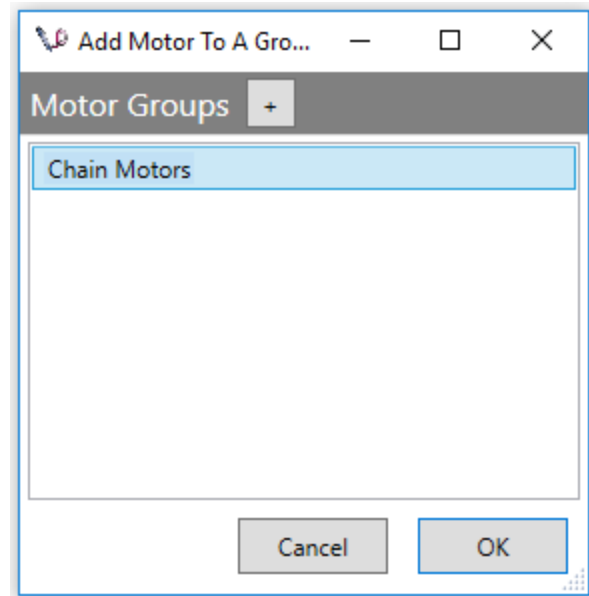
To change the group's name click it and start typing. To finish adding a motor to the group, be sure the desired group is highlighted by clicking to the right of the name and click OK.



EDITING A GROUP

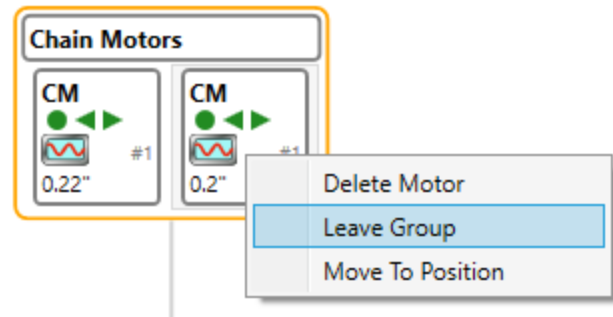
ADDING A MOTOR

To add a motor to a group right click the motor and choose Add To Group. From the Motor Groups dialog, select the group and click OK.



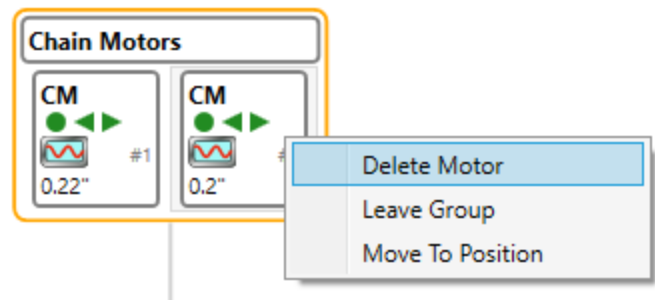
REMOVING A MOTOR

On the **Cue Grid**, right click the specific motor and choose Leave Group. This will remove the motor and its movements from the group without deleting it from the show.



DELETING A MOTOR

On the **Cue Grid**, right click the specific motor and choose Delete Motor. This will delete the motor and its movements from the show completely.

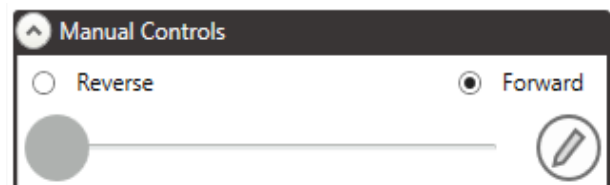


GROUP MOTOR PROPERTIES

Selecting a group will open up its properties in the Stagehand Properties Panel on the left. It is divided up into several sections listed below.

MANUAL CONTROLS

Here the entire group can be manually jogged by moving the slider to the right. The direction is controlled by the two radio buttons above the slider.



POSITION DELTA

The difference between each motor's position is shown here. The more motors in a group the more position delta indicators will be present. If there is no difference in position, nothing will be displayed here.

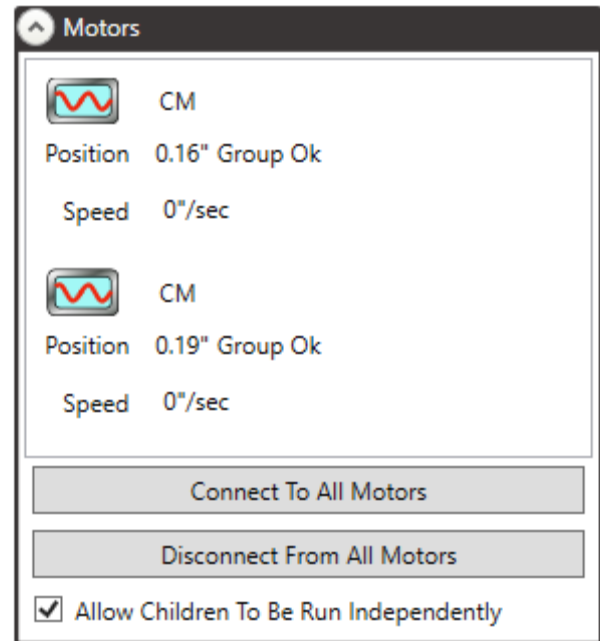


MOTORS

The first thing in this section is a list of all the motors and their statuses in the group.

Following that, are the buttons to connect or disconnect all of the motors in the group.

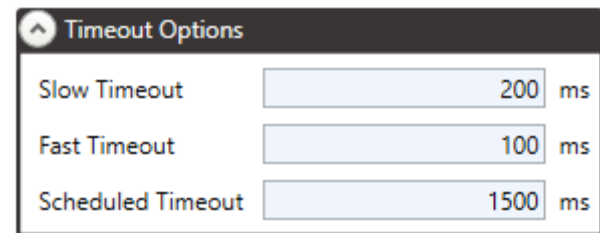
Lastly, there is a checkbox labeled Allow Children To Be Run Independently. When this is checked the individual motors are allowed to be moved (jogged or Move To Position) independently of the group. When this is unchecked, the only way for the motors to move is with group motion.



TIMEOUT OPTIONS

The first two timeouts control how fast a group reacts to a network issue. When a cue is loaded, a watchdog (a fancy networking term) is created that monitors the group through the end of cued motion.

If the motors don't respond within the specified time, motion is aborted and you'll see a Group Fault icon

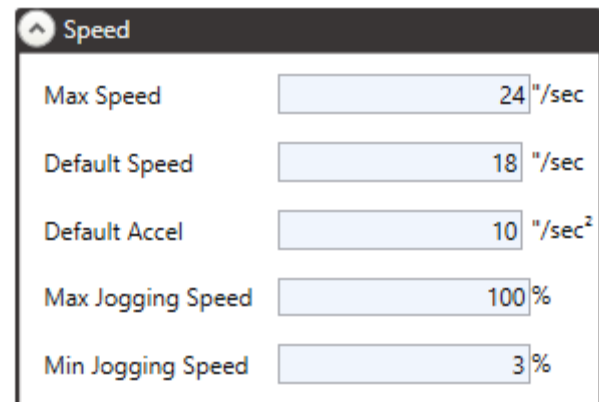


The watchdog uses the slow timeout while the cue is loaded. When the cue is executed it switches to the fast timeout to determine how much time can elapse before faulting.

The scheduled timeout is the amount of time the watchdog sticks around after a cue completes. Keeping this at 1500ms allows for cue links to behave properly.

SPEED

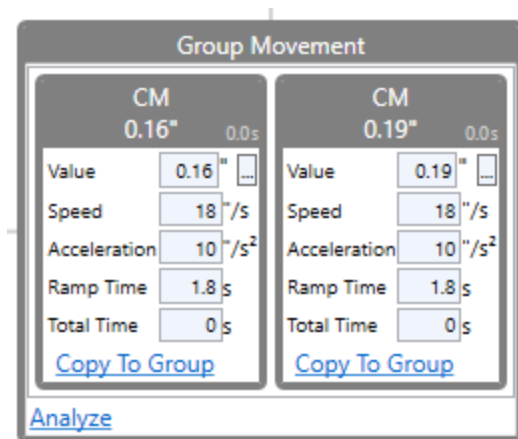
Similar to a motor's speed section, the only difference is these values will auto calculate to the slowest of the grouped motors. For instance, if two motors are added to a group, the first with a max speed of 20 and the second with a max speed of 12, the group's max speed will be set to 12. These default values will be the initial value for new group movements as well as used as the speed and accel for the jog wheel on the Console and the Spikemark Pendant.



Speed	
Max Speed	24 "/sec
Default Speed	18 "/sec
Default Accel	10 "/sec ²
Max Jogging Speed	100 %
Min Jogging Speed	3 %

GROUP MOVEMENTS

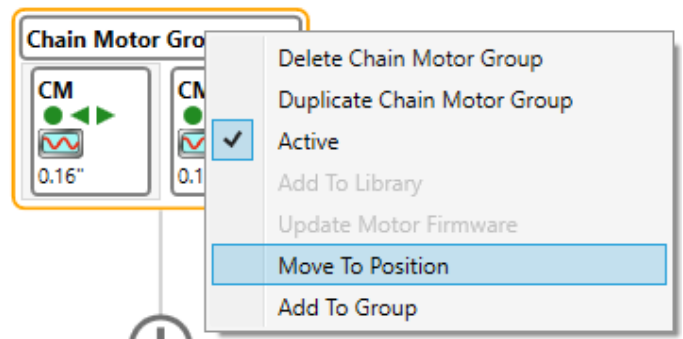
A group movement is a collection of motor movements. This allows the motors to move to different locations for complex motion. The only difference between motor movements is the addition of a Copy To Group button. The copy to group button copies all of its settings to the rest of the motor movements in the group movement.



Group Movement			
CM 0.16"		CM 0.19"	
Value	0.16"	Value	0.19"
Speed	18 "/s	Speed	18 "/s
Acceleration	10 "/s ²	Acceleration	10 "/s ²
Ramp Time	1.8 s	Ramp Time	1.8 s
Total Time	0 s	Total Time	0 s
Copy To Group		Copy To Group	
Analyze			

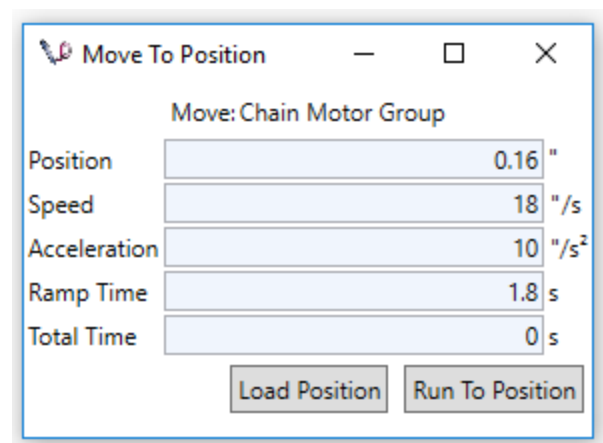
MOVE TO POSITION

Similar to regular motors a group can be Moved To Position (MTP) by right clicking the group in the **Cue Grid** and clicking Move To Position.



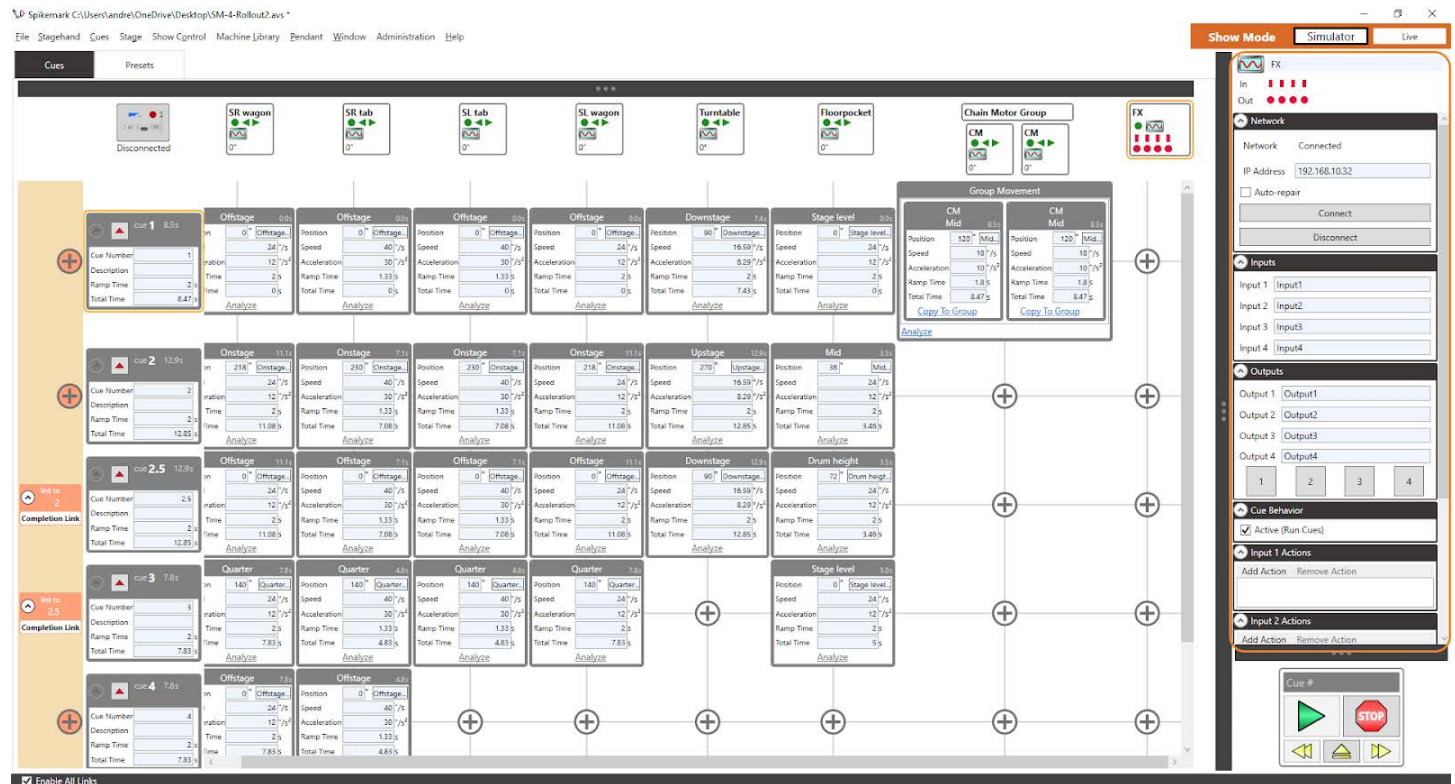
This will open the Move To Position dialog box. Simply enter the target position and speed information like a regular cue. Load position and then Run To Position. The thing to note about this is that all motors in the group will be run to the same position.

If children are able to be moved independently, you can also right click each motor and have a separate MTP window open for each motor. Just be sure to verify you're loading and running the correct window!



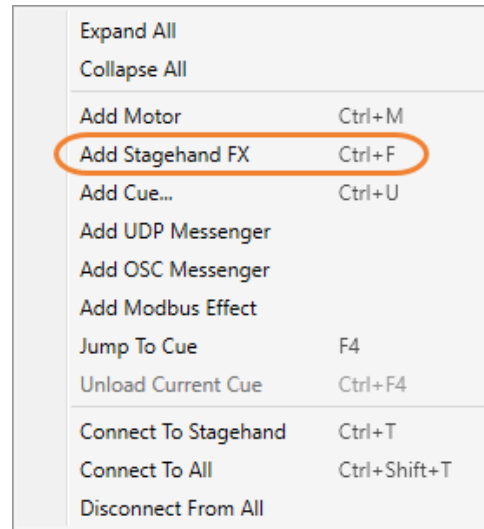
STAGEHAND FX

A Stagehand FX (or FX) is an input/output device that has a collection of values which are typically set once during a production. It differs from a Stagehand Motor, which controls the position of a motor, whereas the Stagehand FX turns any device (motor, valve, etc.) on or off. The Stagehand FX Properties Panel is on the right side of the Spikemark screen and allows you to edit all of the FX configuration values for the show.



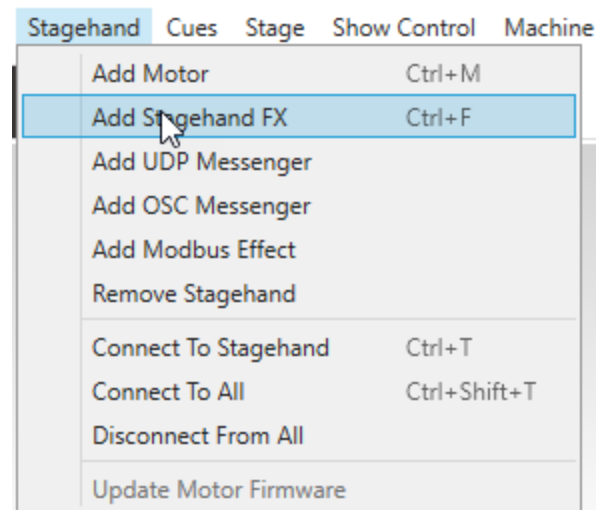
ADDING A NEW STAGEHAND FX

Right-click in the **Cue Grid** and select Add Stagehand FX.



-- OR --

In the **Stagehand** menu, click Add Stagehand FX.

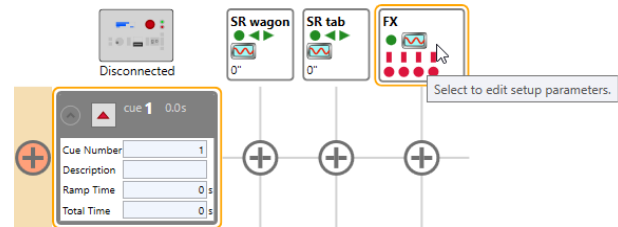


With Spikemark open and active, press **Ctrl + F**.

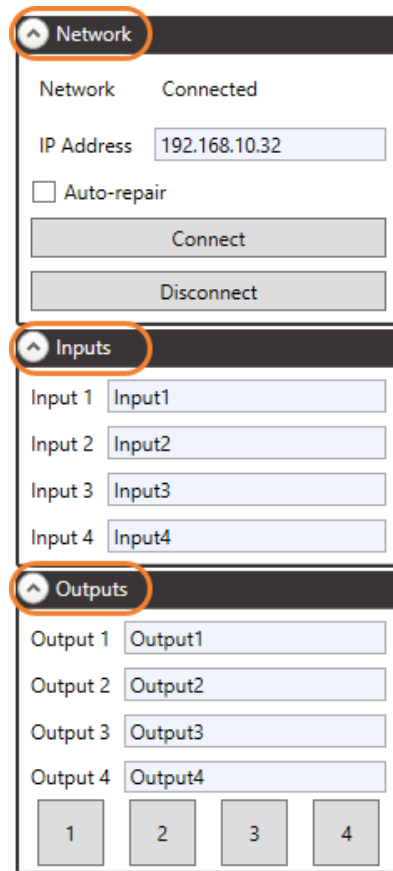
STAGEHAND FX CONFIGURATION

1. Select the Stagehand FX you wish to update in the **Cue Grid**.

The selected Stagehand FX will be indicated with an orange outline.



2. Once you have selected an FX in the Cue Grid, you can begin editing its values in the FX Properties Panel, the scrolling window on the right side of the Spikemark screen that contains sections of values grouped by function. You can collapse or expand these sections to show or hide the information.



RENAMING AN FX

To help identify all the Stagehand FX devices in your show, you can give each FX a unique name. Additionally, you can rename all of the Inputs and all of the Outputs for an FX to help remember the purpose of each switch in the Stagehand FX.

1. Select the Stagehand FX to be edited in the **Cue Grid** and then select the field that contains the default name.

In the figure, the default name is "FX."



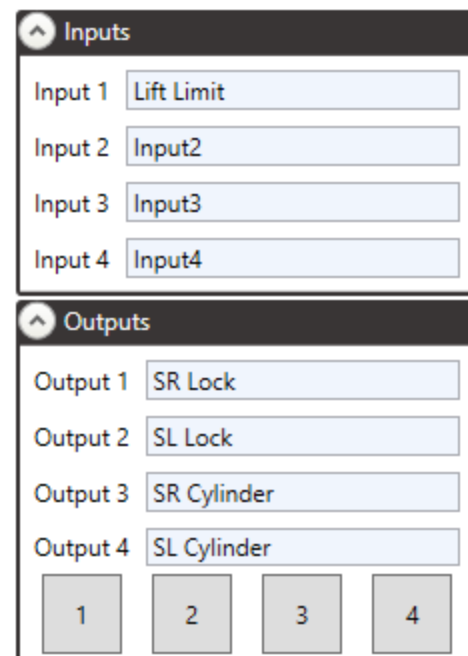
2. Type a new name into the field and press the Tab key or click out of the field to update the name in the Cue Grid.

In this figure, the new name is "Trap Door."














RENAMING FX INPUTS AND OUTPUTS

1. Select the Stagehand FX to be edited in the **Cue Grid**.
2. In the **Inputs** section of the **FX Properties Panel**, enter the new Input name(s) and in the **Outputs** section of the FX Properties Panel, enter the new Output name(s).



FX STATUS ICONS

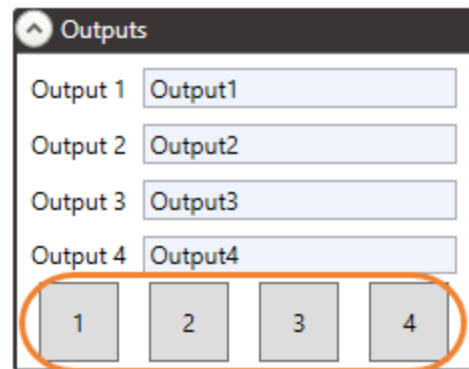
Stagehand FX status information is displayed next to the Stagehand FX name in the Stagehand FX Properties Panel and in the Cue Grid column headers. The status of the Stagehand FX device is indicated by various icons. Each icon status is described below.

Icon	Status
	FX disconnected from the network.
	FX connected to the network, but idle.
	FX is inactive and won't run cues or affect cue links.
	FX has completed a cue.
	Emergency stop.
	Cue loaded.
	Soft stopping, but not yet fully stopped.
	Stopped mid-cue by a soft-stop command.
	An output is active in manual mode.
	One (or more) output(s) is running in a cue.
	All outputs have been turned off because of a fault condition.

MANUALLY ACTIVATING FX OUTPUTS

If you want to test a Stagehand FX output switch, you can use the manual output buttons in the Stagehand FX Properties Panel. Press the button that corresponds to the output you wish to activate. The button behaves like a momentary switch; the FX Output will be active as long as the button is held down. When you release the button, the FX Output will deactivate.

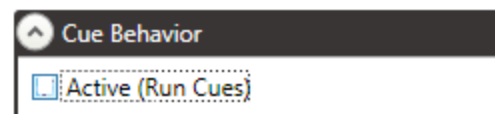
1. Select the Stagehand FX you wish to activate in the **Cue Grid**.
2. Click and hold down one of the output buttons in the **Outputs** section of the **Stagehand FX Properties Panel**.
3. Release the button to deactivate the output.



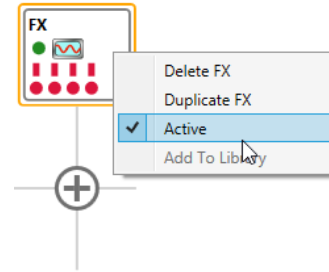
SETTING THE FX ACTIVE MODE

Most of the time, you will want the Stagehand FX to load and run cues normally. However, there are occasions when an effect needs to be temporarily removed from the show. Perhaps there is a problem with the scenery on a winch track, or perhaps you need to run through movements using only the Stagehands downstage and don't want anything upstage to move.

1. Select the Stagehand FX you wish to disable temporarily in the **Cue Grid**.
2. In the **Cue Behavior** section of the **Stagehand FX Properties Panel**, deselect the Active field.
The FX will not run cues until the Active field is selected again.



3. You can also set the Active mode by right-clicking on the **Cue Grid** header as shown.



The Active state of a Stagehand FX can be controlled through any FX Input action. Using an input on a Stagehand FX, you can quickly deactivate one or many Stagehand Motors or FXs.

FX INPUT ACTION

Stagehand FX Inputs can be used in a couple of different ways to help create complex cue sequences. In the “Linking Cues by FX Input” section on page [22](#), you’ll learn how to use FX Inputs to fire cue links, but here we will illustrate another way to use FX Inputs: Input Actions.

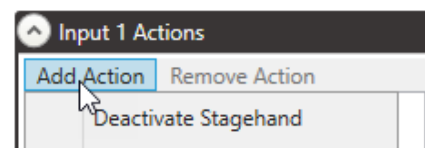
Input Actions introduce a way to trigger events in the show that are not directly related to a cue. FX Input Actions give you a way to tell Spikemark to do something whenever an input is activated, regardless of what cue is running. Here are the current available actions:

1. Deactivate Stagehand
2. Soft Stop Stagehand
3. Run Cue
4. Run Next Cue
5. Activate Output
6. Disable FX Output

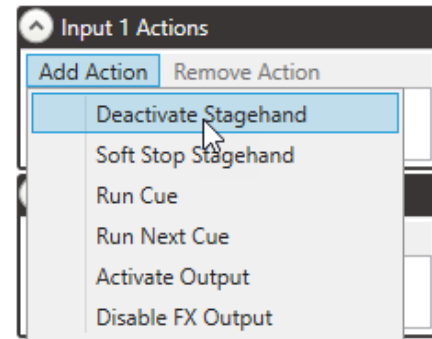
DEACTIVATING STAGEHAND FX ACTION

You can define an Input Action that will toggle the Active state of one or more Stagehand Motors or FXs to temporarily keep them from running cues during the show. This may be handy if you have a scenic element that is involved in a number of cues, but requires tight synchronization with an actor’s movements. Some nights the computer sequencing works fine, but some nights you need to take manual control of the motor and jog it to match the actor. When that happens, you don’t want to mess up all the other cues in the sequence, so you wire an “Override” button into a Stagehand FX and configure it as illustrated in the steps below.

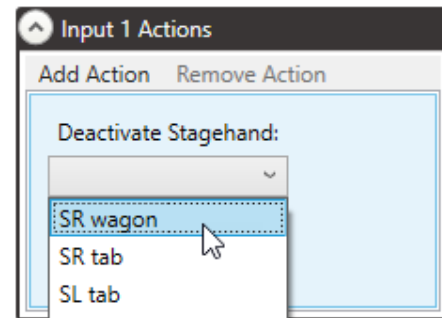
1. Select the Stagehand FX you wish to configure in the **Cue Grid**.
2. In the **Input (1, 2, 3 or 4) Action** section of the **FX Properties Panel**, click the Add Action button.



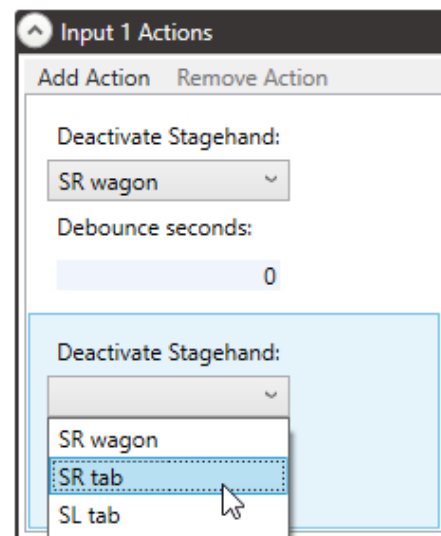
3. Select Deactivate Stagehand as the action type.



4. From the Deactivate Stagehand drop down menu, select the FX or Motor that should be deactivated when the FX Input is closed.



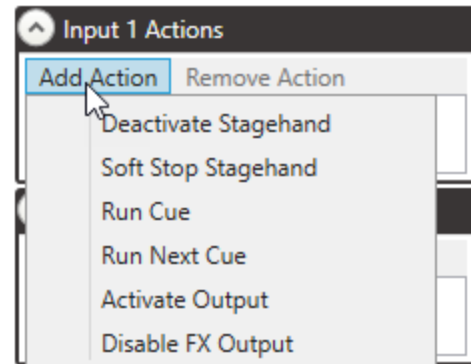
5. Repeat as necessary for when you would like a single FX Input to deactivate multiple Stagehand Motors or FXs.



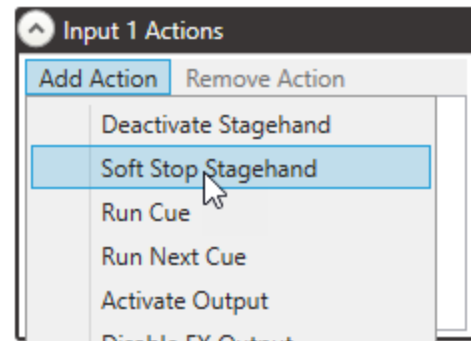
SOFT STOP FX ACTION

There are times when you may need to soft stop a device in a show based on actor timing. For example, maybe you have two concentric turntables, which both start moving at the same time, but one needs to stop when an actor says a particular line. In this example, you would not want to set up a cue in which the turntable reached a target position, rather you could use an FX input and set it so that when manually activated after the actor spoke the line, the motor would slow down to its programmed deceleration rate and then stop.

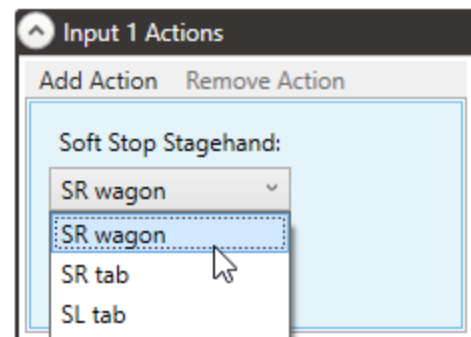
1. Select the Stagehand FX you wish to configure in the **Cue Grid**.
2. In the **Input (1, 2, 3 or 4) Action** section of the **FX Properties Panel**, click the Add Action button.



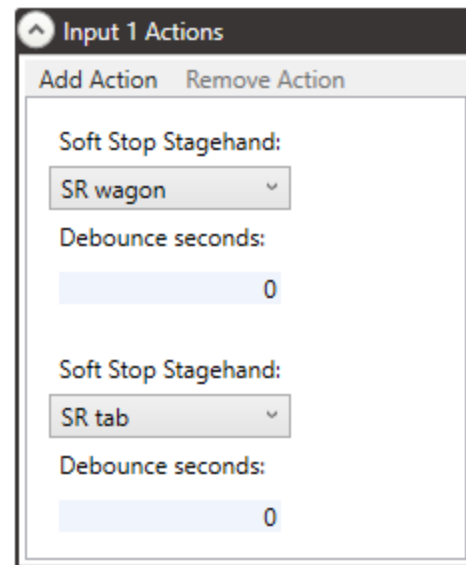
3. Select Soft Stop Stagehand as the action type.



4. From the Soft Stop Stagehand drop down menu, select the FX or Motor that should be soft stopped when the FX Input is closed.



5. Repeat as necessary if you would like a single FX Input to deactivate multiple Stagehand Motors or FXs.

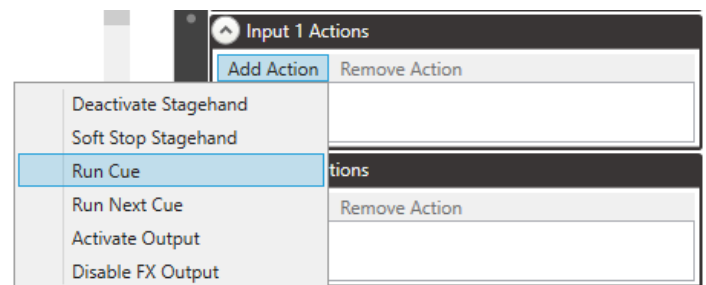


RUN CUE FX ACTION

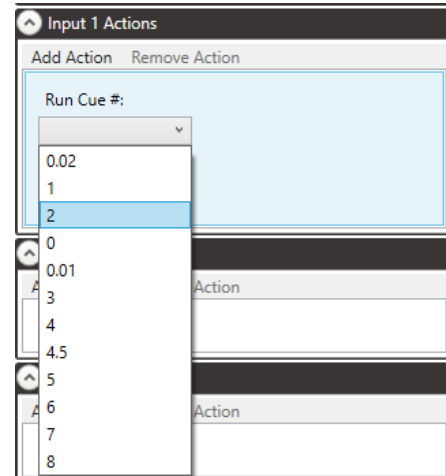
Probably one of the most popular actions for a Stagehand FX is to simply run a specific cue, or even a cue sequence, if the target cue has links. This is particularly beneficial if there is no real order to a show or presentation, and the operator must use discretion as to what and when to trigger an effect.

To add a Run Cue FX Action:

1. Select the Stagehand FX for which you wish to remove the Input Action in the **Cue Grid**.
2. In the **Input (1, 2, 3, or 4) Action** section of the **Stagehand FX Properties Panel**, and click the Add Action button.
3. Select Run Cue as the action type.



4. Select the target cue # from the dropdown menu.

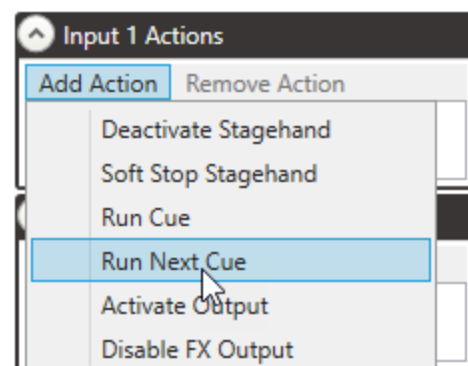


RUN NEXT CUE FX ACTION

In some environments, particularly interactive exhibits, you may want Spikemark to run through a series of cues in sequential order by repeatedly pressing a single button. For instance, a presenter giving an interactive lecture may need to execute a motion sequence of motorized props in an exhibit. In such a case, Spikemark can be used with a Stagehand FX, a button wired into an input, and a Run Next Cue action. When the presenter needs to move to the next sequence, she simply presses the button connected to Stagehand FX and the exhibit advances. While this action is rarely useful in live theatre, it does find use in non-traditional applications.

To add a Run Next Cue FX action:

1. Select the Stagehand FX you wish to configure in the **Cue Grid**.
2. In the **Input (1, 2, 3, or 4) Action** section of the **Stagehand FX Properties Panel**, and click the Add Action button.
3. Select Run Next Cue as the action type.



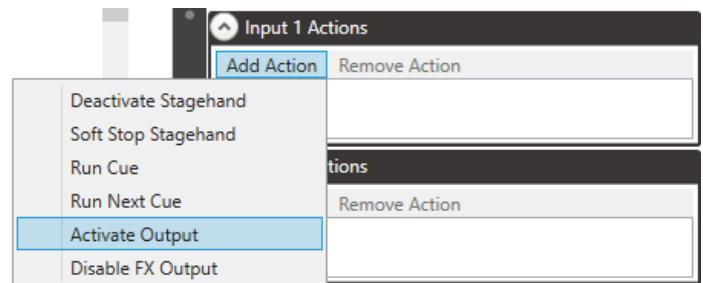
NOTE:

The Run Next Cue action will effectively create an always-armed GO button. This is not intended for use where the motorized effects could pose a threat to human safety.

ACTIVATE OUTPUT STAGEHAND FX ACTION

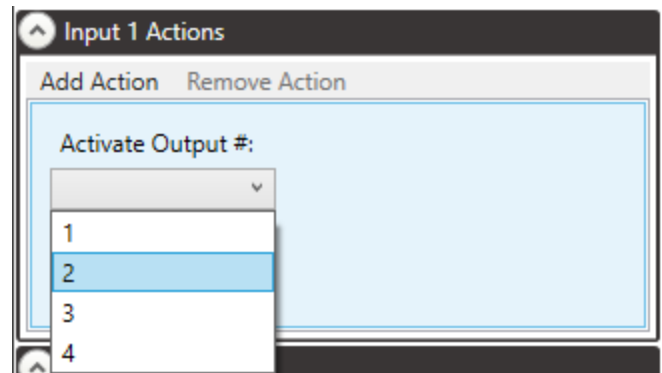
Probably, the second most common FX Action is triggering some other external effect using an FX Output. This action will turn the Output on until it is turned off, or a soft stop or an e-stop is triggered. Check the [Stagehand FX User Manual](#) for detailed information on the proper set up of an FX with an external effect.

1. Select the Stagehand FX for which you wish to remove the Input Action in the **Cue Grid**.
2. In the **Input (1, 2, 3 or 4) Action** section of the **Stagehand FX Properties Panel**, and click the Add Action button. Select **Activate Output**.



3. Select the correct Output # from the dropdown list for the desired effect to be activated.

(Note: If you have multiple Stagehand FXs in one show, your Input Action can only trigger an Output on the same Stagehand FX.)

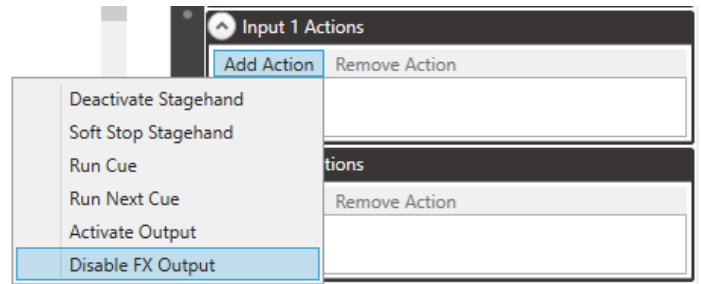


DISABLE OUTPUT STAGEHAND FX ACTION

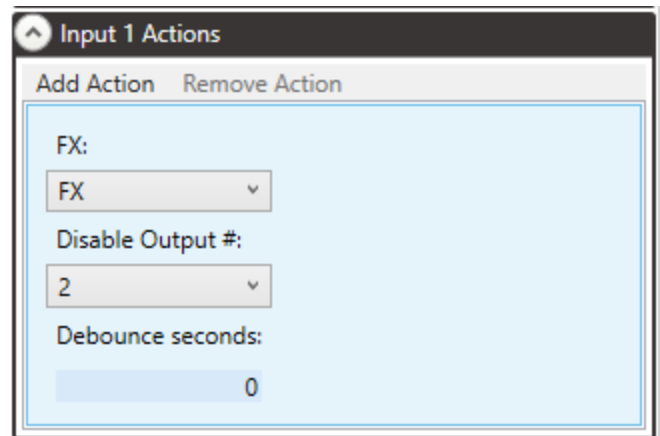
Just like you can activate an FX Output, you can also disable an FX Output.

1. Select the Stagehand FX for which you wish to remove the Input Action in the **Cue Grid**.

2. In the **Input (1, 2, 3 or 4) Action** section of the **Stagehand FX Properties Panel**, and click the Add Action button. Select **Disable FX Output**.

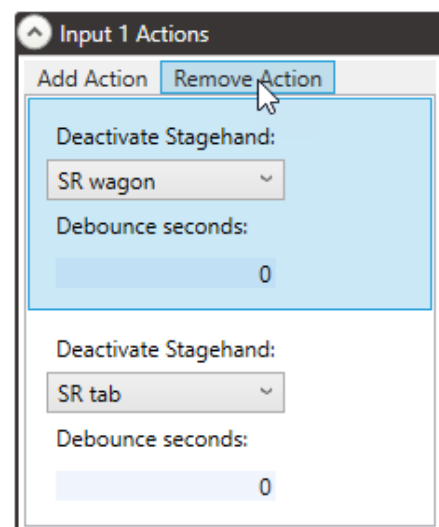


3. Select the FX in which the Output effect is connected.
4. Select the Output # that you would like to disable.



REMOVING A STAGEHAND FX INPUT ACTION

5. Select the Stagehand FX for which you wish to remove the Input Action in the **Cue Grid**.
6. In the **Input (1, 2, 3 or 4) Action** section of the **Stagehand FX Properties Panel**, highlight the desired action and press Remove Action.



INPUT ACTION DEBOUNCE

When creating an Input Action, you will notice an input field that says 'Debounce seconds.' When manually activating an Input Action, there is the possibility of signals being sent repeatedly in a short amount of time, whether by a contact in your switch engaging and disengaging rapidly or electrical noise in the signal being sent. The Debounce time is the amount of time between contacts closing before Spikemark will register another action. If this time is too long, you could miss another Input Action. Usually 0.1-0.5 sec is a good choice for Debounce time.

SHOW CONTROL

Creative Conners, Inc has been working diligently to integrate show movement with other software and controls. While we philosophically believe from a safety standpoint that scenic automation needs to be a dedicated control system, we still want to integrate with systems for other aspects of a production. We achieve this by providing our dedicated control system that is independently controlled but can be monitored from all other systems. We still integrate with other systems by sharing information such as position data and Spikemark can even trigger external events.

MULTIPLE NETWORK CARDS

Over the years we have learned that most folks on the media server side of productions have stronger opinions than we do when it comes to networking. When connecting to other systems (lighting, sound, video) to trigger cues or send position data we have found the cleanest path is to sandbox the automation network and any others by simply setting up a 2nd NIC on the Spikemark PC - setting that up properly for the connected network. A USB to Ethernet adapter is almost less expensive than all the Roloids and Advil you will require to sort through network connection issues.

THE UDP MESSENGER

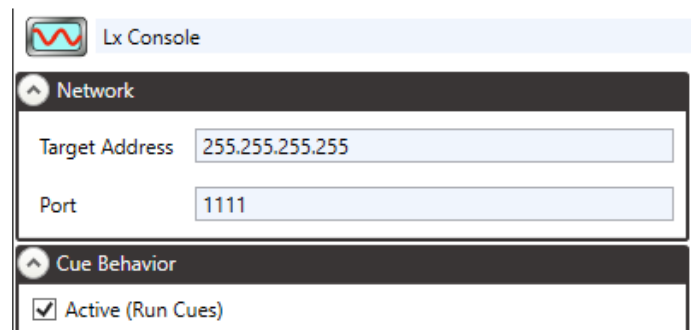
The UDP Messenger, formerly the Stagehand Messenger, allows communication to outside control systems via a simple UDP text string. This feature was introduced to communicate with a proprietary AV controller in a permanent installation.

UDP NETWORK SETUP

- 1. Name** - The name can be changed. In our example, we are outputting to our Lighting Console.
- 2. Network** - Target Address and Port must match the address and port that the receiving device (the Lighting Console here) is listening to.

In this case we are using the broadcast address for everything on the network.

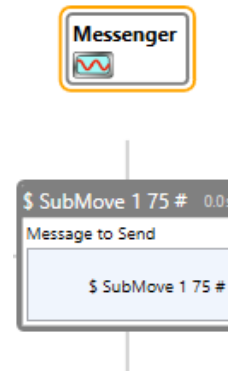
- 3. Cue Behavior** - Swap between Active and Sleep modes.



The screenshot shows a software interface titled "Lx Console". It has two main sections: "Network" and "Cue Behavior". In the "Network" section, there are two input fields: "Target Address" with the value "255.255.255.255" and "Port" with the value "1111". In the "Cue Behavior" section, there is a checkbox labeled "Active (Run Cues)" which is checked.

On the **Cue Grid**, add a “movement” by clicking on the plus sign to create a Message Box where you would type in your UDP String. In this example we are executing a manual entry to move the Submaster Fader 1 on our Lighting Console to 75%.

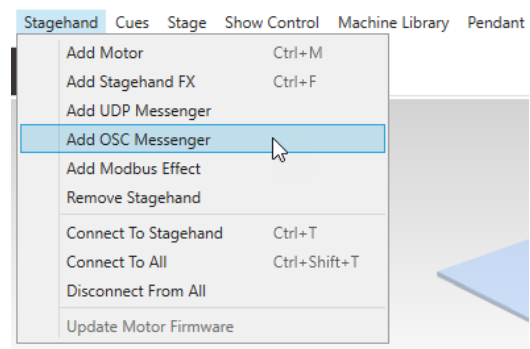
(Note: Check the User Guide of your receiving device for the appropriate string commands.)



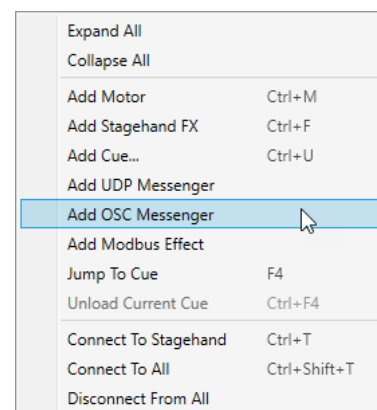
The UDP Messenger sends out whatever text string is in the movement window when the cue is executed. In the above example, Spikemark is triggering a submaster change, though the text string can be anything you like. The important part is that the device listening for it understands it.

THE OSC MESSENGER

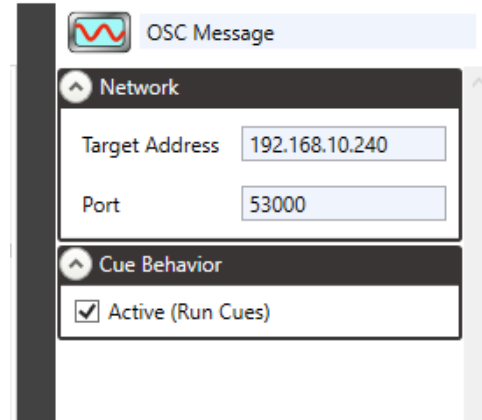
A new OSC Messenger can be added in one of two ways. The first is from the menu bar at the top click **Stagehand** and then Add OSC Messenger.



The second way to add an OSC Messenger is to right click on the empty space in the cue grid and click Add OSC Messenger.



Once an OSC Messenger has been added, click it to bring up its three editable properties. Target Address, Port, and Active. Target Address is the OSC Server address, Port is the UDP port the OSC Server is listening for commands on, and Active is whether or not the movements will be loaded and executed.



OSC MOVEMENT

Spikemark supports sending OSC UDP messages and the OSC movement is where all the parts of an OSC message are put together.



MESSAGE FORMAT

An OSC message is made up of an address and any number of arguments where the arguments are any combination of strings, integers, and floats. Each software receiving OSC messages will have their own list of commands that are triggered when they receive an OSC message. This is represented in Spikemark as a comma separated list. The first item in the list is the OSC address which always starts with a forward slash (/) and then the arguments. For example, the command for adjusting the faders of a QLab cue is: `/cue/1/sliderLevel,1,0`. The OSC address is `/cue/1/sliderLevel` and the two arguments channel and decibel level are respectively `1` and `0`. This part starts to get complicated. We will dig further into this format as we go over how to build your own command library.

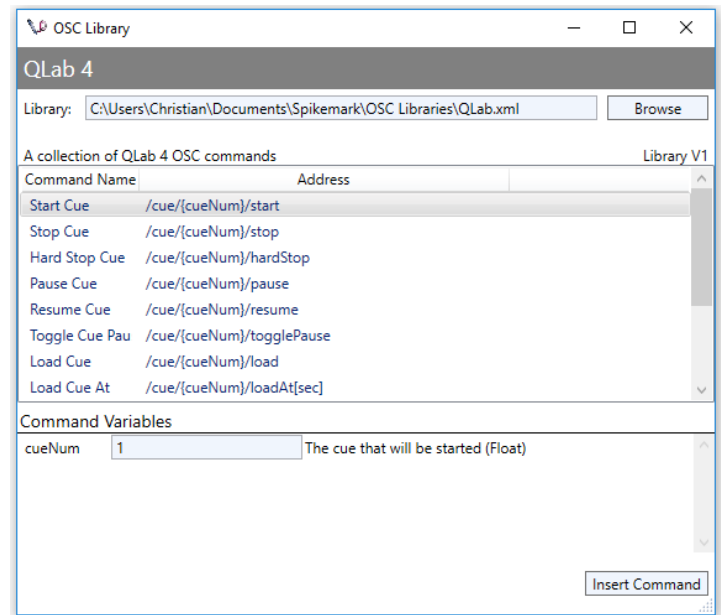
COMMAND LIBRARY

The command library is a collection of XML files that have OSC messages already defined. This makes it quick and easy to add OSC messages into your Command Library. The command library can be expanded which is covered in the next section.

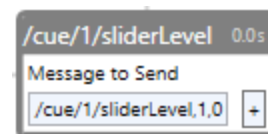
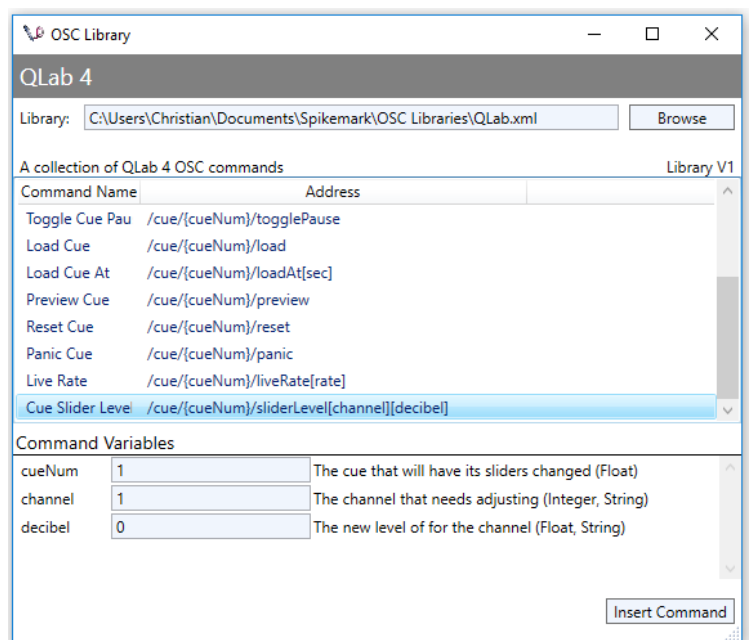


To use the command library click the + button on an OSC movement.

By default Spikemark tries to load the QLab command library. The default library location is 'C:\Users\{USERNAME}\Documents\Spikemark\OSC Libraries'. Using the Browse button, any OSC command library can be opened. Then, using the Commands dropdown, a command can be picked and its OSC parameters and arguments will become editable.



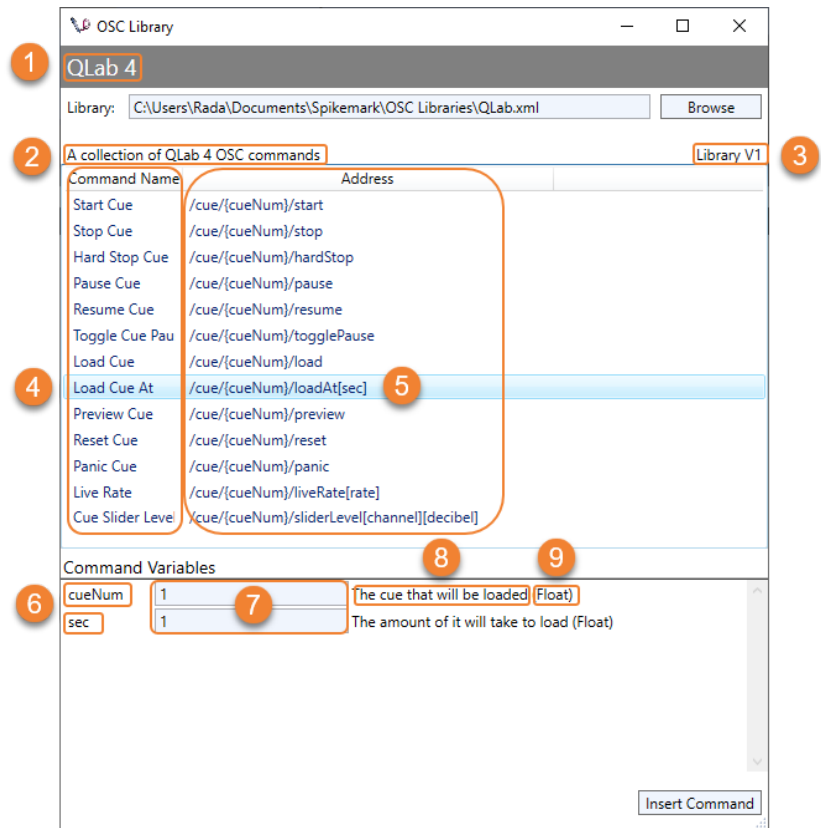
Once all the values have been changed, clicking the Insert Command button will close the OSC Library dialog and update the OSC movement.



EXPANDING THE COMMAND LIBRARY

The nice thing about the command library is that each library is written in a simple XML format, allowing each library to be easily edited and created. When Spikemark was installed on your computer, a new folder was added at “C:\Users\{user}\Documents\Spikemark\OSC Libraries” and some starter libraries were added. These starter libraries can be expanded or new custom libraries can be added. Currently, Spikemark only has two preloaded OSC libraries. One OSC Library is Figure 53’s QLab and the other is ETC’s EOS family of lighting consoles. If you are looking to build a library of commands for a different control platform with spikemark, you will need to build your new OSC library in the XML format defined below. Let’s go over everything that you can have control of when you build your new OSC command library.

1. OSC Library Name
2. OSC Library Description
3. OSC Library Version Number
4. OSC Command Name
5. OSC Command Address
6. Address’s Parameters and Arguments
7. Input Field for the value of the Parameters and Arguments
8. Descriptions of Parameters and Arguments
9. Data Type of Parameters and Arguments.



COMMAND LIBRARY FORMAT

Every OSC Command Library follows the same structure. These libraries can be built in your favorite text editor that can be saved as an XML file with a file extension of .xml. Below is an example of what the “Load Cue At” QLab command looks like in the XML format. The text in white has the ability to change the details of the OSC Library indicated above.

```
<osc>
  <libraryName>QLab 4</libraryName>
  <libraryDescription>A collection of QLab 4 OSC commands</libraryDescription>
  <libraryVersion>1</libraryVersion>
  <command>
    <name>Load Cue At</name>
    <address>/cue/{cueNum}/loadAt[sec]</address>
    <parameter>
      <name>cueNum</name>
      <description>The cue that will be loaded</description>
      <dataType>float</dataType>
      <default>1</default>
    </parameter>
    <argument>
      <name>sec</name>
      <description>The amount of it will take to load</description>
      <dataType>float</dataType>
      <default>1</default>
    </argument>
  </command>
</osc>
```

This structure may seem complex, but let us demystify it for you. Even though the QLab and EOS Libraries are already built, let’s go through the process of adding a new OSC library into Spikemark. Spikemark needs to be told where to place information when you are building a new OSC Library. Let’s start a new library that we will call “Brand New Library”. Open up your favorite Text Editor that will let

you save as an XML file with a file extension of .xml. Keep following along to import your first command into your new OSC Library.

1. Start with the two lines below.

- **<osc></osc>** - This is the root tag that contains all of the other tags.

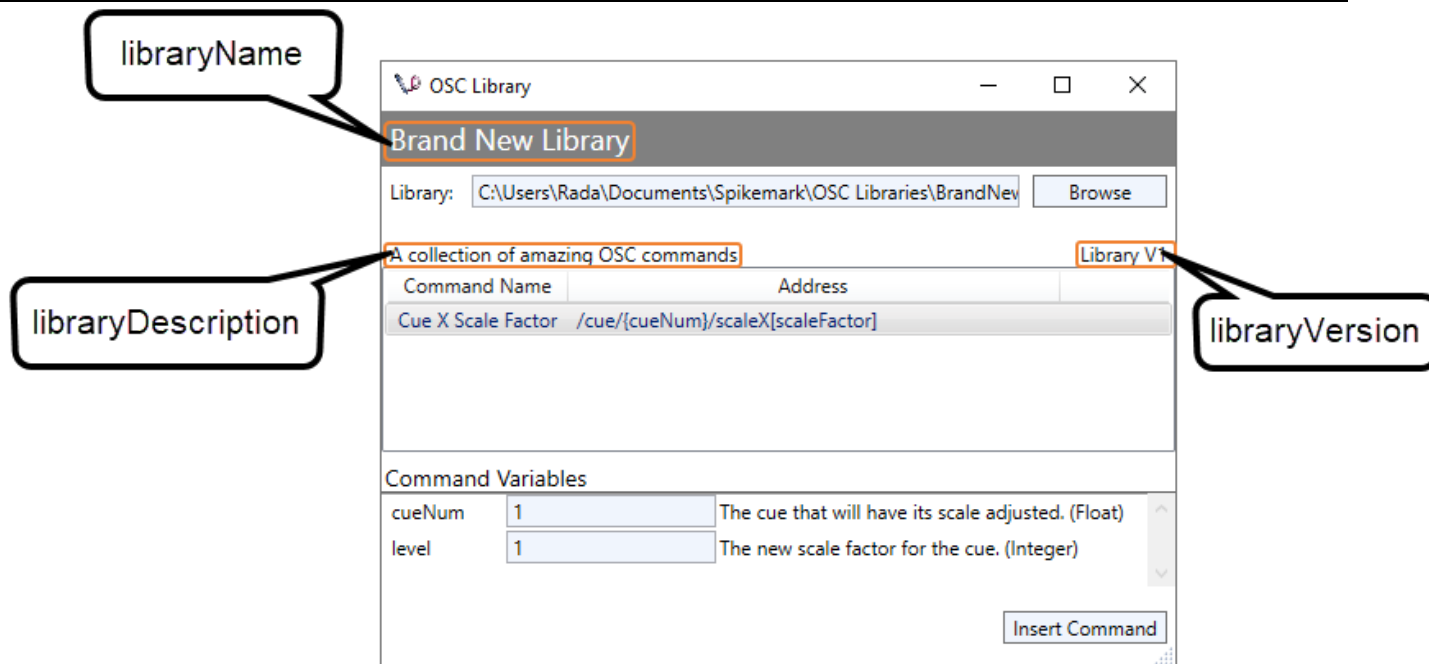
```
<osc>
</osc>
```

2. Next we will input the descriptors that are displayed in the OSC Library in Spikemark.

- **<libraryName>Brand New Library</libraryName>**.
- **<libraryDescription>A collection of amazing OSC commands</libraryDescription>**.
- **<libraryVersion>1</libraryVersion>**.

The white text below you can change to anything you like.

```
<osc>
  <libraryName>Brand New Library</libraryName>
  <libraryDescription>A collection of amazing OSC commands</libraryDescription>
  <libraryVersion>1</libraryVersion>
</osc>
```



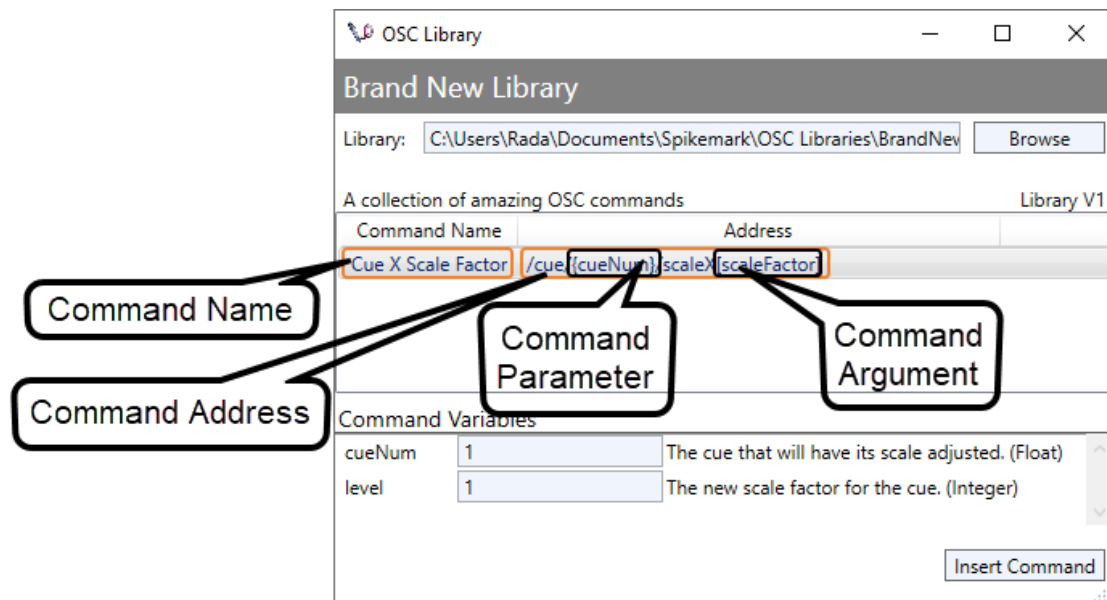
3. Now let's add our first command block. You will repeat this step for each command you want to send to a software capable of being controlled by an OSC Command. Let's make our first command to control the X Scale Factor of a video cue. The Command Address is what will be sent to the software you are trying to control. The Command Address can be found from the manufacturers website of the software that will be controlled from Spikemark. The Command Address consists of two parts: Parameters and Arguments. We indicate Parameters with { } and Arguments with []. For our example, the Command Address for controlling the X Scale of a video cue will be noted as: /cue{cueNum}/scaleX[scaleFactor]. The cueNum is the parameter and the scaleFactor is the attribute for this Command Address.

- **<command></command>** - This tag can be repeated an infinite number of times inside the **<osc></osc>** tag, each one representing a different OSC Command.
 - A Command will contain:
 - **<name>Cue X Scale Factor</name>** This tag holds the name of your command.
 - **<address>/cue{cueNum}/scaleX[scaleFactor]</address>** tag. This tag contains what will be sent over OSC. Each OSC Address uses the same structure */method/{parameter}/method/[argument]*. In this example, we are using the "Cue" method with the parameter "{cueNum}" and the method "scaleX" with the argument "[scaleFactor]".
 - **<parameter>cueNum</parameter>** You can have multiple parameter tags, but there needs to be the same number of parameters that exist in the **<address></address>** tag.
 - **<argument>scaleFactor</argument>** You can have multiple argument tags, but there needs to be the same number of arguments that exist in the **<address></address>** tag.

```
<osc>
  <libraryName>Custom QLab Library</libraryName>
  <libraryDescription>A collection of amazing OSC commands</libraryDescription>
  <libraryVersion>1</libraryVersion>
  <command>
    <name>Cue X Scale Factor</name>
    <address>/cue/{cueNum}/scaleX[scaleFactor]</address>
    <parameter>

    </parameter>
    <argument>

    </argument>
  </command>
</osc>
```



4. In each Parameter and Argument tag, there will be 4 additional tags to give information for:
- **<name></name>** - This tag must match what is entered for the Parameter or Argument in the **<address></address>** tag.
 - **<description></description>** - This is the description that will be displayed next to each Parameter and Argument.
 - **<dataTypes></dataTypes>** - This tag describes the type of data that is allowed. The valid values for this tag are float, integer, or string.
 - **<default></default>** - This tag is required for both Parameters and Arguments. This will be the default value for the Parameter and the Argument.

- **<optional><optional>** - If an argument is required, this tag can be omitted. If an argument is not required, a tag with the value of True can be added.

```
<osc>
  <libraryName>Custom QLab Library</libraryName>
  <libraryDescription>A collection of amazing OSC commands</libraryDescription>
  <libraryVersion>1</libraryVersion>
  <command>
    <name>Load Cue At</name>
    <address>/cue/{cueNum}/LoadAt[sec]</address>
    <parameter>
      <name>cueNum</name>
      <description>The cue that will be loaded.</description>
      <dataType>float</dataType>
      <default>1</default>
    </parameter>
    <argument>
      <name>sec</name>
      <description>The amount of time it will take to load</description>
      <dataType>float</dataType>
      <default>1</default>
    </argument>
  </command>
</osc>
```

Parameter Name

Argument Name

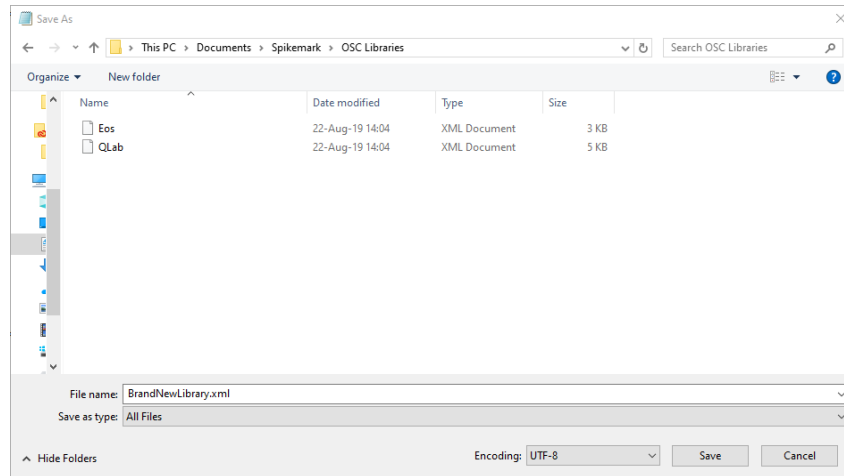
Default Input Field

Description

dataType

Parameter Name	Default Input Field	Description	dataType
cueNum	1	The cue that will have its scale adjusted. (Float)	Float
level	1	The new scale factor for the cue (Integer)	Integer

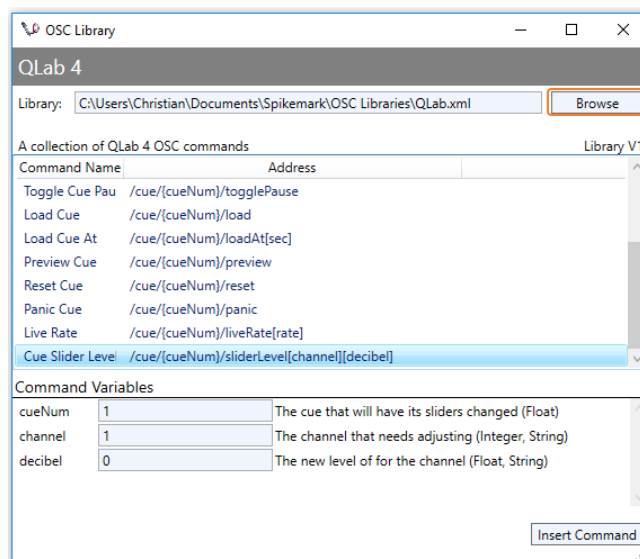
Congratulations! You just added your first command in a new OSC Library. Repeat for each command you want to add into your OSC Library. Once you have added all the commands for this library, save your new library as an XML file with the file extension .xml and save it in “C:\Users\{user}\Documents\Spikemark\OSC Libraries” to have it saved where the other OSC Libraries are saved for Spikemark.



Once you have saved your new OSC Library, you can recall it by Clicking on the “+” button on an OSC movement.



Then, Click “Browse”.



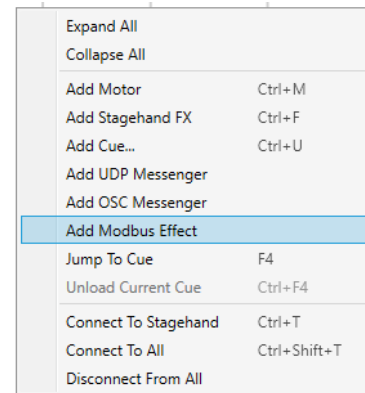
Select your newly created .xml file and use your new commands.

THE MODBUS EFFECT

Spikemark has the ability to connect to external, third-party devices using Modbus TCP/IP protocols. Similar to a Stagehand FX, the Modbus Effect allows you to select a specific Modbus coil to be ACTIVATED or CLEARED that could control any number of other effects.

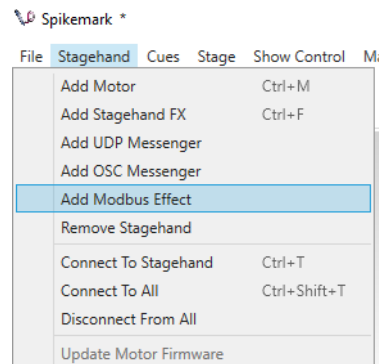
ADDING A NEW MODBUS EFFECT

1. Right click in the **Cue Grid** and select Add Modbus Effect.



-- OR --

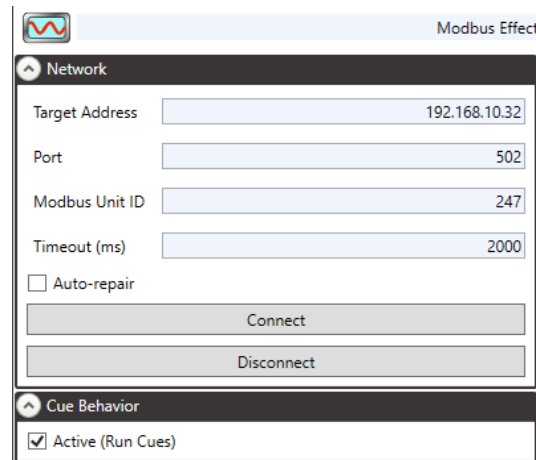
2. In the Menu Bar, click on **Stagehand**, and select Add Modbus Effect.



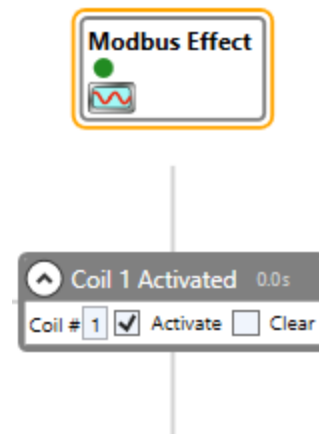
MODBUS CONFIGURATION

- 1. Name** - Change the name to match your external device.
- 2. Network** - A slightly more complex network setup in which you must match IP Address, Port and Modbus Unit ID both in Spikemark and on your external device.
- 3. Timeout** - The amount of time Spikemark will attempt to send data to a Modbus device. If it doesn't communicate with a device in that time, the Modbus communication will give up.
- 4. Cue Behavior** - Switch between Active and Sleep modes.

In the **Cue Grid**, click the Plus button to add a "movement" box. This allows you to choose the coil number you want to control, and whether it is being Activated or Cleared.



The screenshot shows the 'Modbus Effect' configuration window. It has a 'Network' section with fields for 'Target Address' (192.168.10.32), 'Port' (502), 'Modbus Unit ID' (247), and 'Timeout (ms)' (2000). There is an 'Auto-repair' checkbox and 'Connect' and 'Disconnect' buttons. Below is a 'Cue Behavior' section with a checked 'Active (Run Cues)' checkbox.



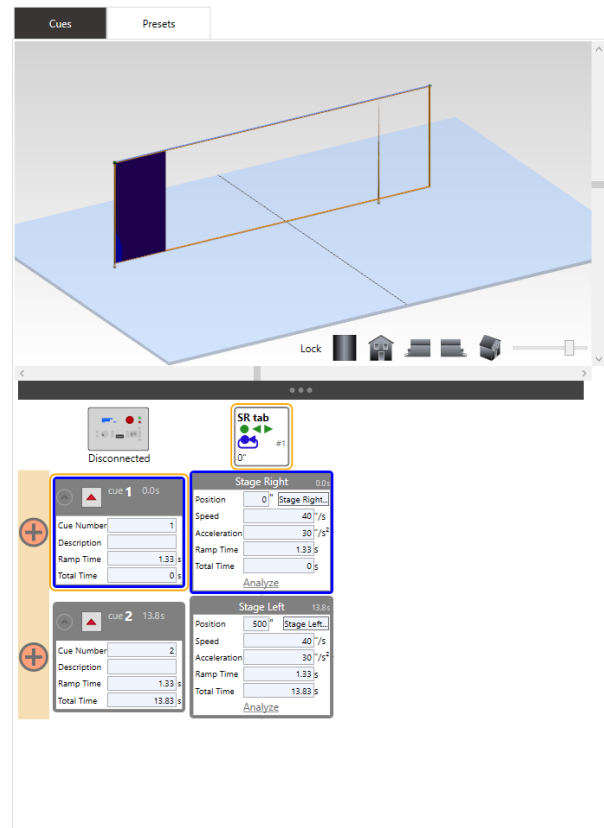
DATATON WATCHOUT INTEGRATION

Projection design is commonplace in an increasing number of theatrical performances. With media servers and automation gear existing on the same network, it seems obvious that these systems should share data to create stunning effects by coordinating video and scenic motion. To that end, Spikemark now has the ability to output position data from any motor in your show to a WATCHOUT media server. It takes a little extra configuration in Spikemark and WATCHOUT to get both systems talking to each other, but the effort is rewarded with truly stunning effects. Alright, let's get started!

Assume that we have a little show with an automated wall panel attached to a traveler track. On cue, the wall panel will track from Stage Right to Stage Left. As the panel tracks across the stage, we need to project a graphic onto the panel and have the image move along as if it were glued to the panel. The image here shows an example of this Cue in Spikemark.

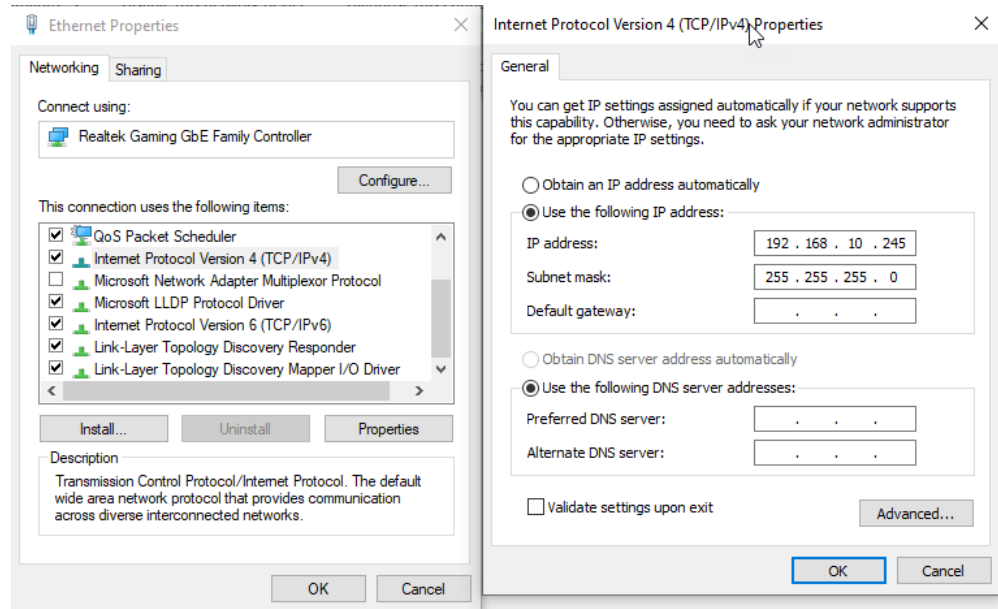
In order for WATCHOUT's projectors to track an image synchronously with the motorized panel, we need to send the position of the panel to WATCHOUT. Spikemark will communicate with WATCHOUT over the Ethernet network, so both the Spikemark automation computer and the WATCHOUT production computer will need to be plugged into the same physical network.

NOTE: While it is possible to use the same computer that is running Spikemark to monitor WATCHOUT position, the two software programs don't always communicate properly or consistently when the IP Address receiving the data is the same as the Spikemark address. It is best to use two separate computers.

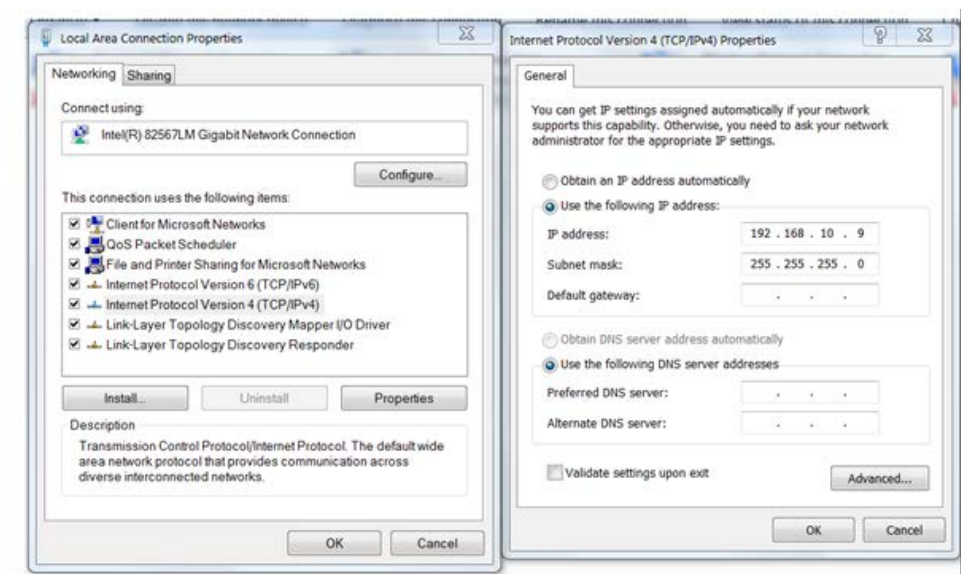


In addition, the two computers need to have compatible IP Addresses that share the first three segments of the address with unique fourth segments. You can see that the addresses are assigned as such:

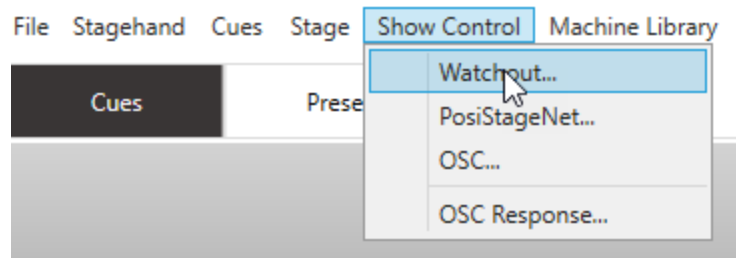
The Spikemark computer is **192.168.10.245**



And the WATCHOUT computer is **192.168.10.9**



With both computers addressed properly, we need to tell Spikemark where to send the position data. In Spikemark, select 'Watchout...' from the **Show Control** menu.



A dialog pops up with some configuration details that determine what data is sent to WATCHOUT.

From the top the options are:

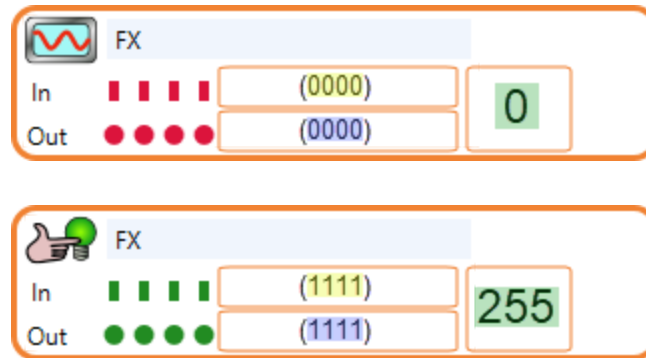
1. **Server Address** - The IP Address of the WATCHOUT production computer
 - a. To send the position data to a backup you will need to use the broadcast address.
2. **Server Port** - The port where WATCHOUT listens for incoming data. By default, WATCHOUT listens on 3040.
3. **Stagehand List** - Each motor in your show is listed. If the “Active” box is checked, that motor’s position information will be sent to WATCHOUT. In the Watchout Name text box, you can enter a name that will be used inside WATCHOUT to identify the motor’s position. The Spikemark motor name and the WATCHOUT name can map however you like. For example, we could have called it “Logo Winch” in Spikemark and “fuzzy pink rabbit” in Watchout.

Each FX is also listed. Unlike the motors in your show, FX’s don’t have a position to report. Instead, the FX will send data to describe which inputs and outputs are activated. The FX will send a value that maps the inputs and outputs as binary bits within a byte. These binary bit values have a corresponding decimal value that Watchout can be programmed to look for. The range for these values is 0-255.

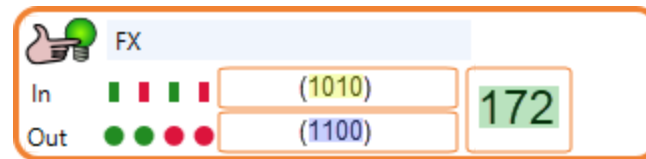
(Input) (Output)	Decimal Value
(11001111)	207

Spikemark has indicators that represent when an input or output is on or off, showing either green or red. When represented as numbers, on (green indicator) is equal to (1) and off (red indicator) is equal to (0). When looking at Spikemark, you can compare the status of your inputs and outputs to see what binary number will be sent to WATCHOUT and read as the decimal value for the binary number. For

example, all red indicators would show a binary number of (00000000), or 0 for your decimal value, while all green indicators would show (11111111), or 255 for the decimal value.



When looking at the below example, you can have a better visualization of how the indicators compare to their binary number. Each green indicator represents a (1), while each red indicator represents a (0). In the example, the full binary number would be (10101100), or 172 for the decimal value.



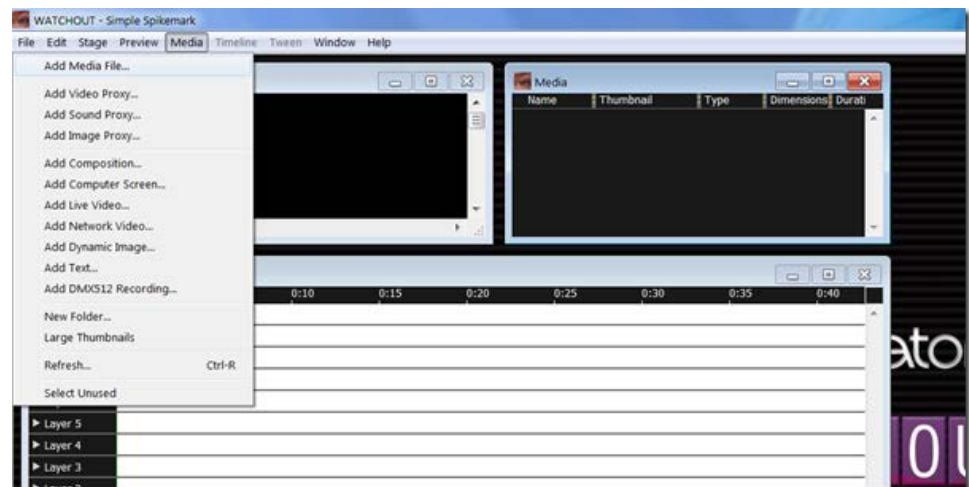
To convert the binary numbers into decimal values, you can easily search for a conversion in Google, a binary calculator application, or the programmer calculator in Windows. You could also do the math on paper or count out the bits, but that may take a bit longer.

- 4. Sending Position Data** - Indicates whether Spikemark is currently sending UDP packets to the address indicated in Server Address.
- 5. Update Interval (ms)** - The frequency with which Spikemark will send position updates to WATCHOUT. The number entered here will determine how many milliseconds should elapse between updates. Higher numbers will result in a slower update cycle. In practice, 30ms is about the fastest rate consistently possible without adversely affecting Spikemark's performance.
- 6. Messages/second** - The number of position updates that are actually being sent to WATCHOUT each second. This number will often bounce around by 1 or 2 messages.
- 7. Include transition rate in messages** - If checked, Spikemark will send WATCHOUT the number of milliseconds that have elapsed since the last position update. WATCHOUT can use this information to smooth the animation of the image as it tracks with the motor. This generally results in a smoother visual result, but can be slightly inaccurate. Feel free to experiment with either setting to get the most appropriate result for your show.
- 8. Send Output** - This is a toggle button to turn on/off the data stream from Spikemark. The data is sent via UDP, which is a connectionless protocol, so there is no harm sending out the packets even if WATCHOUT is disconnected from the network. UDP packets will blissfully fall into oblivion if the

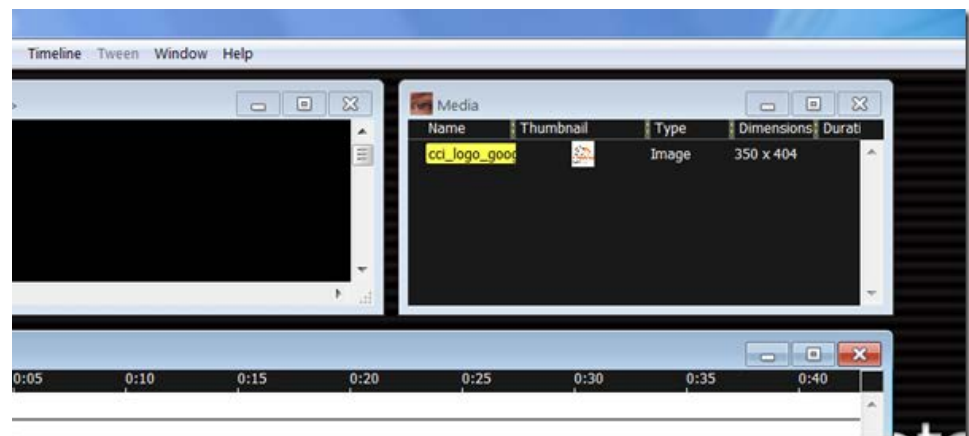
server is not around to receive them so you can start the output stream before WATCHOUT is running.

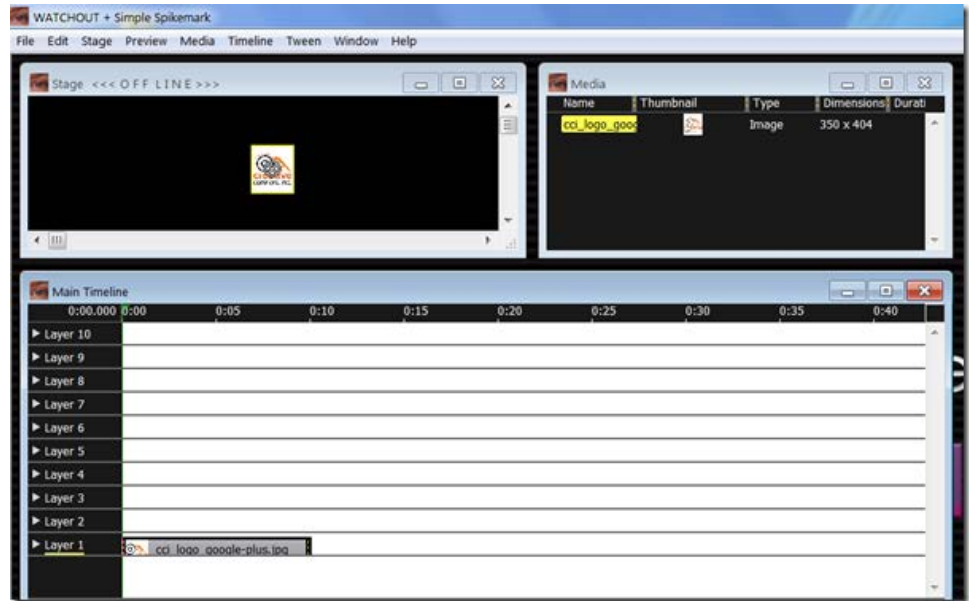
With Spikemark configured and the Send Output button depressed, we are ready to fire up the WATCHOUT production machine. Start WATCHOUT and give your show file a name. As mentioned when we started, we are trying to have an image to be projected on the traveler panel, so our first step in WATCHOUT is to import an image.

Select a Creative Conners Logo image(or any image), which shows up in the Media list.

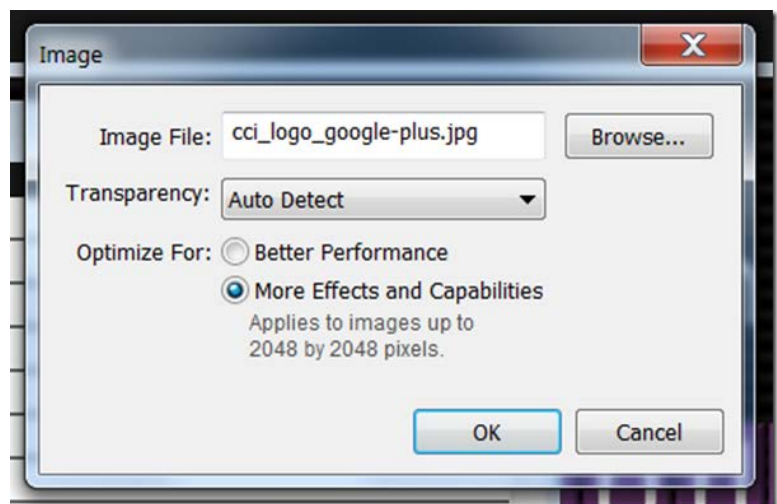


Now drag the image from the Media list into the Stage window. You can see the image displayed in the center of the Stage view and it also shows up in the Main Timeline.

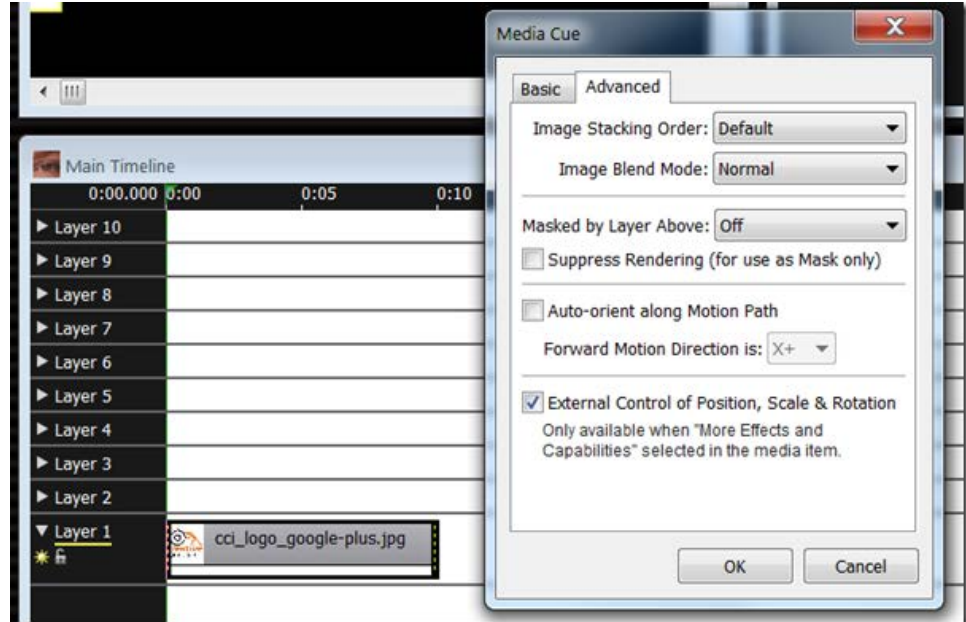




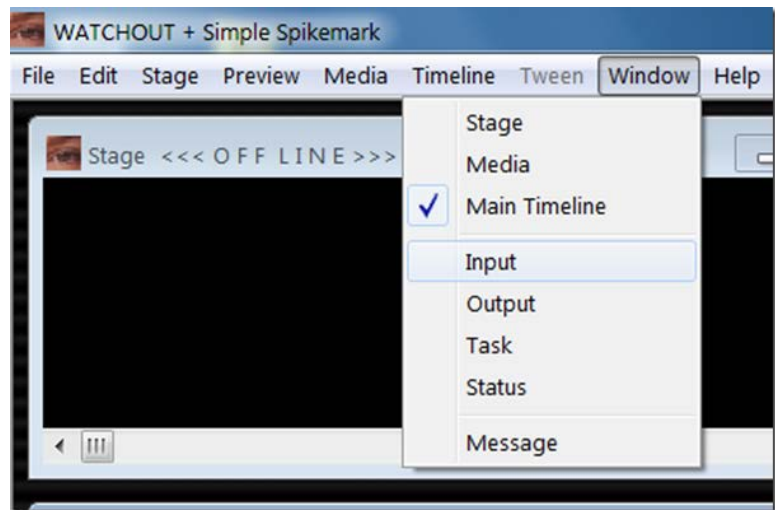
With the image on our virtual stage, we need to start configuring WATCHOUT to listen for data from Spikemark. We have to enable an external source (Spikemark in this case) to control the image position. Double-click on the image in the Media List and select More Effects and Capabilities.



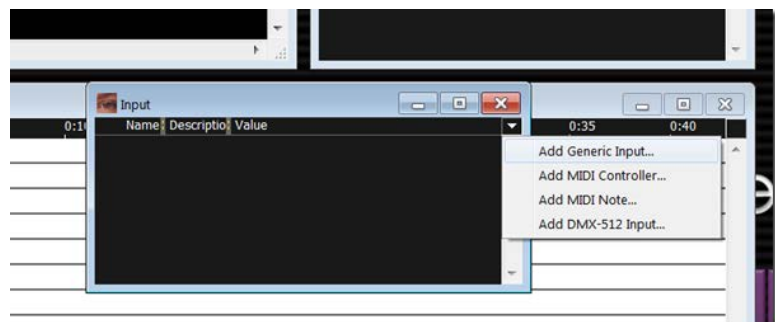
Then, in the Main Timeline, double-click on the image layer to bring up the Media Cue properties window. Select the Advanced tab and check External Control of Position, Scale & Rotation.



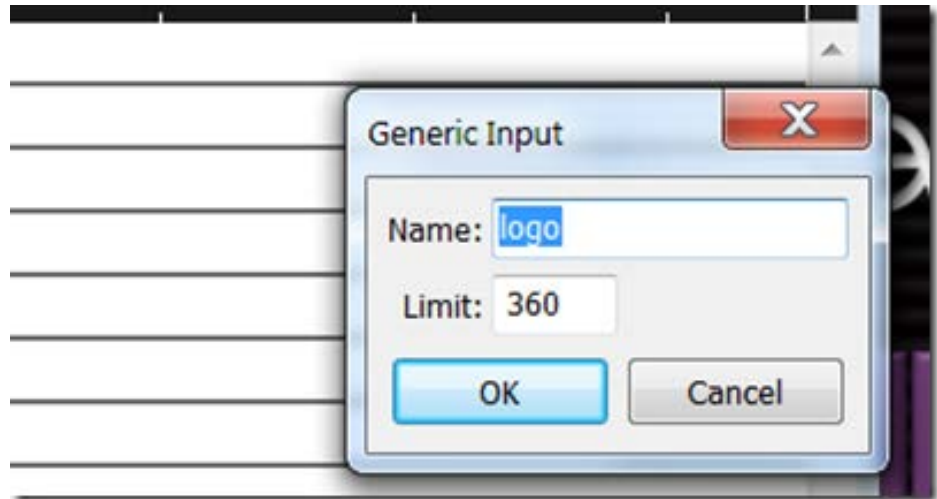
Our next step is to create a Generic Input in WATCHOUT that has a name that matches the Watchout Name we entered into Spikemark. We will use the data received from that Generic Input to move the image around. To add a Generic Input, select Input from the Window menu.



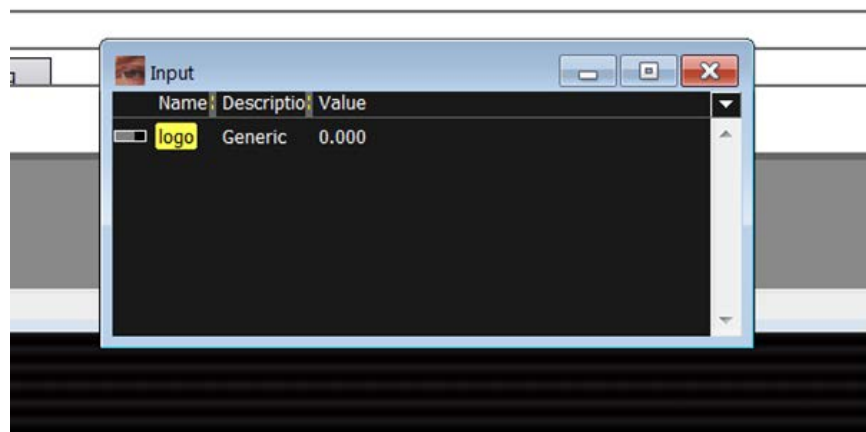
From the Input window, click on the little triangle in the upper right corner. From the menu that appears, select Add Generic Input.



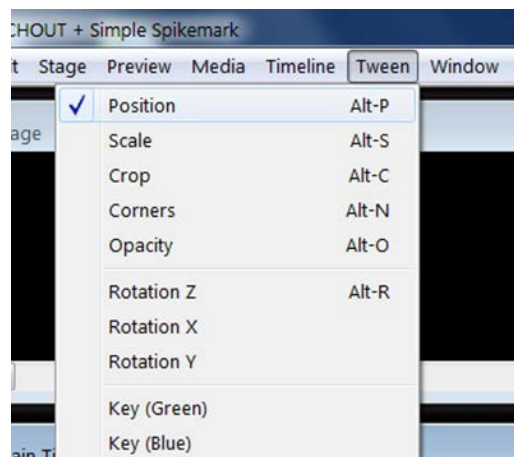
A dialog is presented where you can enter the Name of the input and the Limit of the input value. This step is important to get correct. The Name needs to match the name entered in the Spikemark Watchout Output window... exactly, same case, same spelling, etc. The Limit should match the highest value expected to come from Spikemark. In this case, our traveler has a maximum forward position of 360", so we can enter 360.



Press the OK button and then the new Generic Input will be listed in the Input list with its current value set to 0.00.

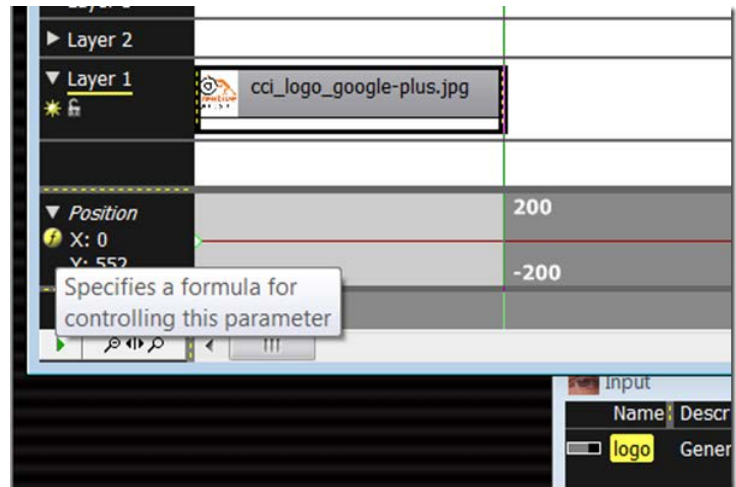


Now, the next step is to connect the value of the Generic Input to the x-axis of the Image so that the Image will move as the Generic Input value changes. To link the image position to the Generic Input value, we will create a formula in the Main Timeline. Select the image layer in the Main Timeline,

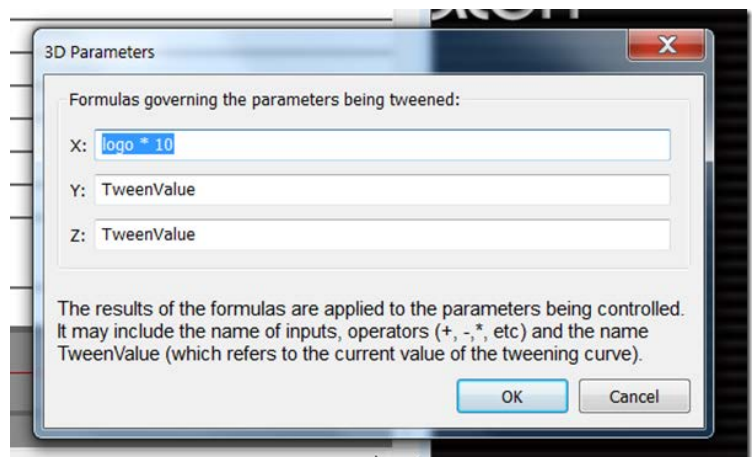


and then from the Tween menu, select Position.

This adds a Position tween track below Layer 1 in the Main Timeline. This is the good part. Now that we have a tween for Position, we can write a formula for linking position. On the left side of the track there is a little round button with an “f” inside. This allows us to write a formula that will link the position of the image to the value of the Generic Input. The value of the Generic Input will be connected to the data stream from Spikemark, and the data stream from Spikemark is driven by the position of the scenery. The knee bone is connected to the leg bone... still with me? Great, click the little *f* function button.

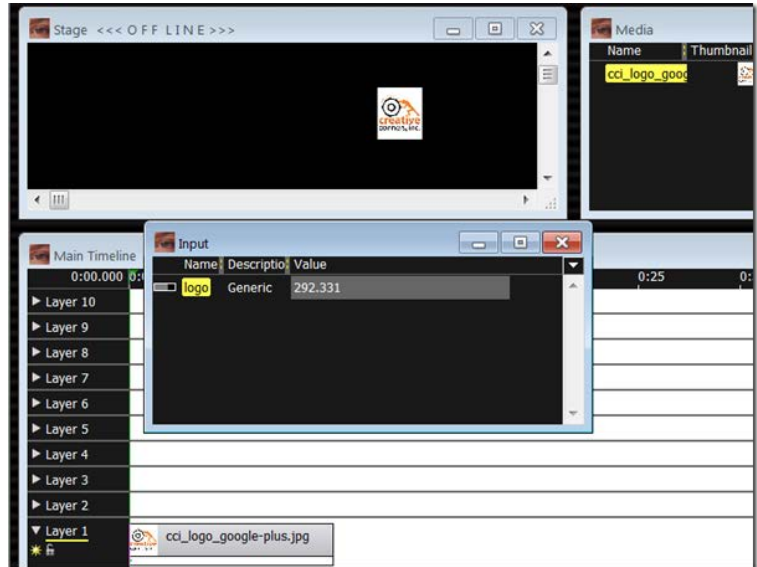


In the dialog box that appears, we enter a formula in the X axis text box. Since this is a traveler track, we want to manipulate the lateral position of the image, but if it was a flying piece of scenery we could instead control the Y axis of the image. To use the value of the Generic Input, we simply type the name of the input. In this case, we are multiplying the value of the input by 10 to get the image to track the correct number of pixels across the stage.

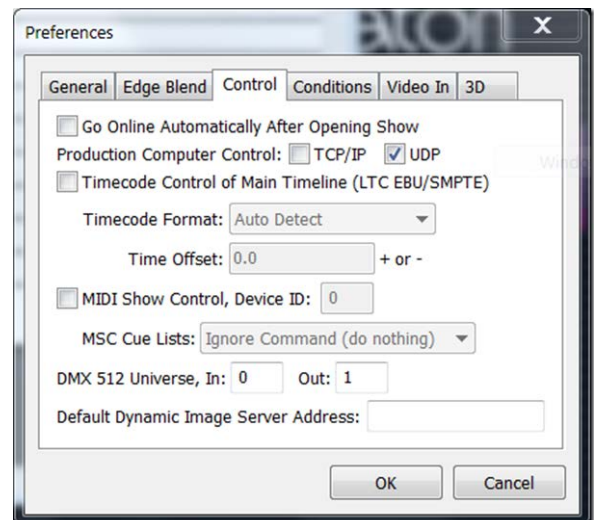


The multiplier you use can be adjusted to fit the specific show.

We are almost there. Before flipping the last switch to connect Spikemark to WATCHOUT, try clicking around in the Value column of the Input list. This will manually adjust the value of the Generic Input. If everything is correct so far, when you alter the Generic Input Value, the image will jump to a new X position in the Stage window.

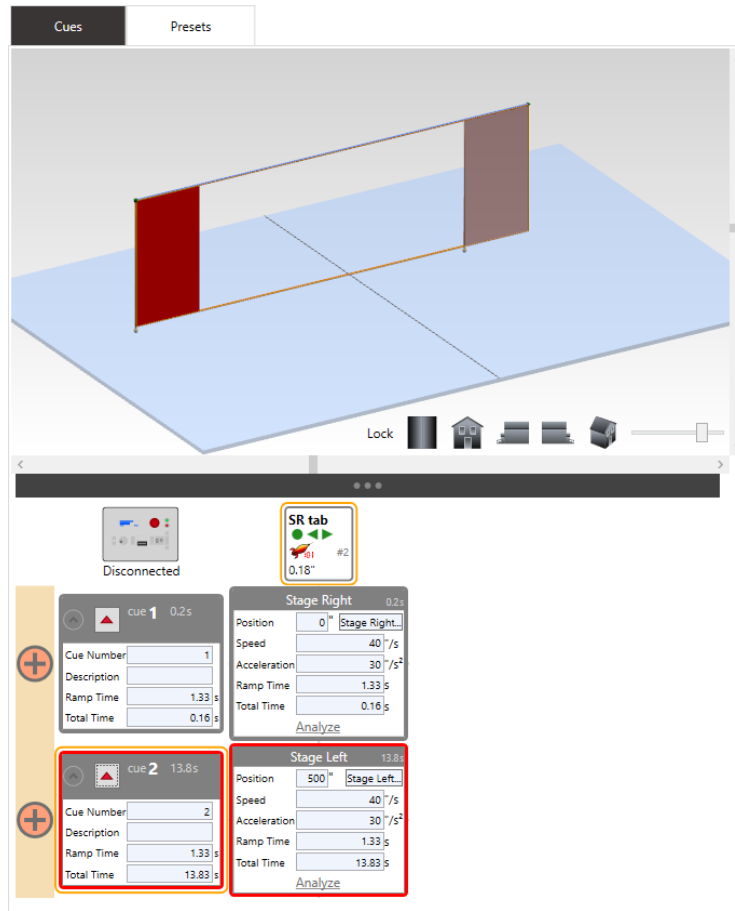
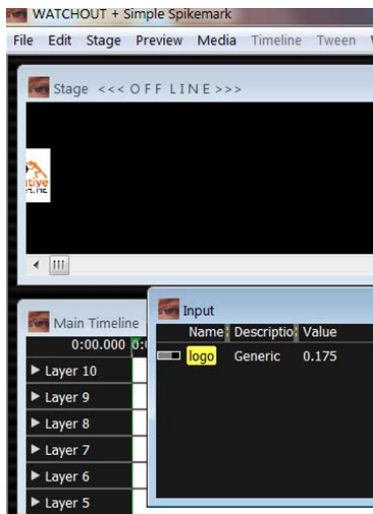


Alright, let's get the WATCHOUT computer listening to the Spikemark computer. From the **File** menu select Preferences. Then from the Control tab, check the UDP box next to Production Computer Control.

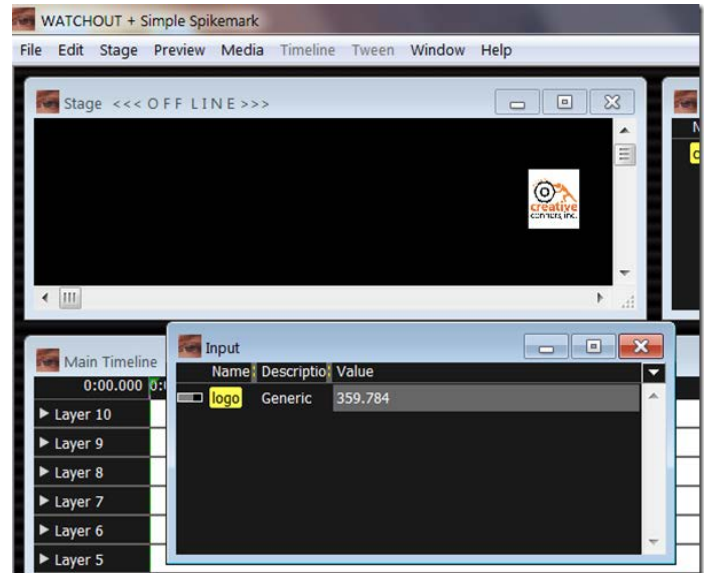
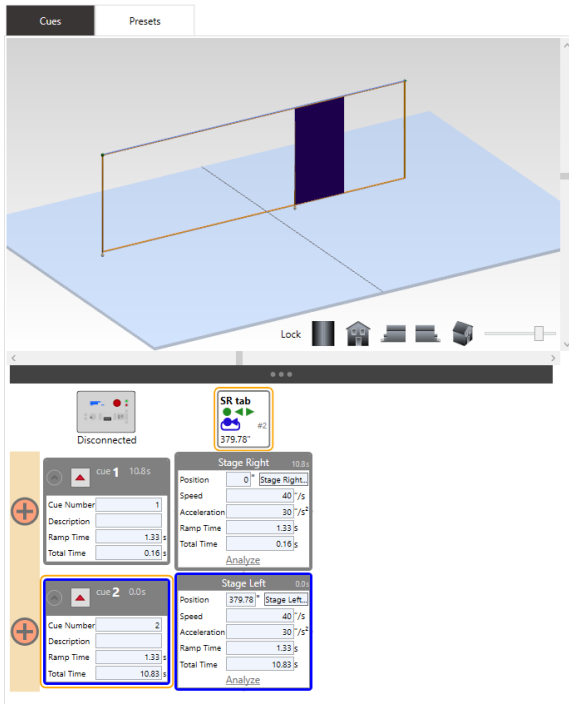


As soon as you click "OK", WATCHOUT will start picking up the position data stream from Spikemark (assuming you pressed the Send Output button in Spikemark) and the image will snap back to match its X position with the motor position. Also, the Generic Input Value should track with the motor position.

Let's load up Cue 2 in Spikemark. Notice that the current motor position is 0.18" in Spikemark, and that the Generic Input Value in WATCHOUT is 0.175 showing that the two systems are communicating.



Now, let's run Cue 2 in Spikemark. When it completes, we can see that the image tracked across the stage in WATCHOUT, matching the motor position!



POSISTAGENET

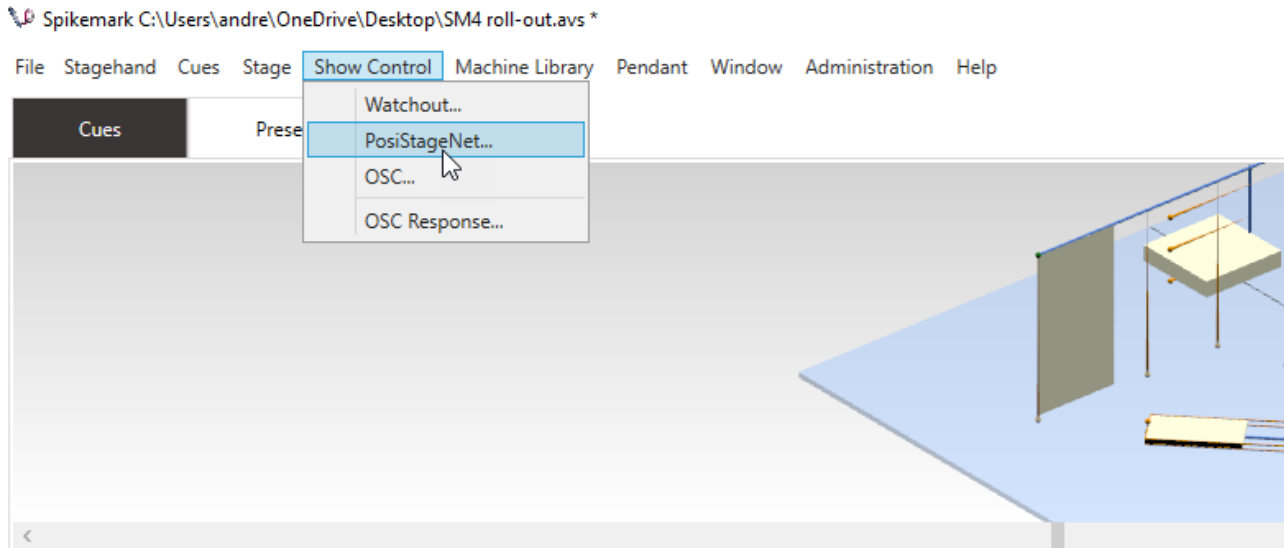
WHAT IS IT

PosiStageNet (PSN) is a communication protocol developed by VYV and MA Lighting for communicating real time position tracking data. This allows Spikemark to broadcast the real time position of any motor in a show to a PSN client like a media server or a lighting console.

The PSN protocol uses a concept of "chunks" to organize the data in a packet. The chunks recursively define all data sections and come together to form a frame. Finally, a collection of contiguous frames come together to form a packet which is transmitted as a UDP packet over the network. More detailed information regarding the PSN protocol can be found at <http://www.posistage.net>

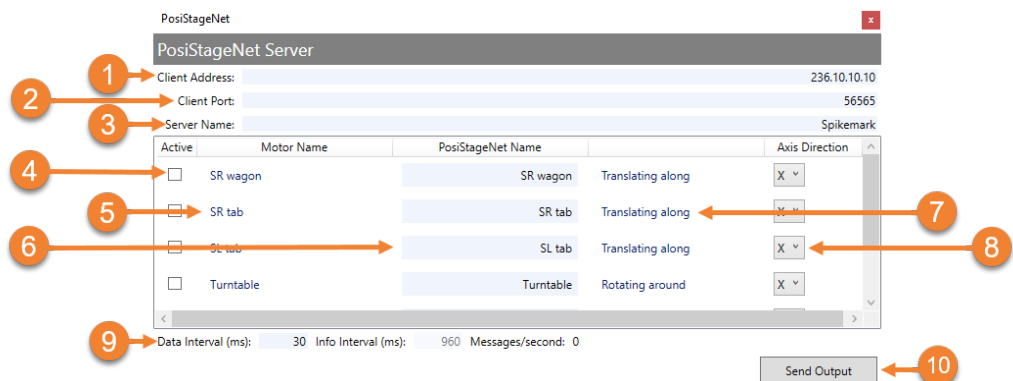
SETUP

To configure the PSN server from the menu bar at the top of the screen click 'Show Control > PosiStageNet...'



This brings up the PSN configuration window with the following options.

1. Client Address
2. Client Port
3. Server Name
4. Active
5. Motor Name
6. PosiStageNet Name
7. Type Of Motion
8. Axis Direction
9. Data & Info Intervals
10. Send Output



CLIENT ADDRESS

The client address is the IP address of the PSN client receiving position data from Spikemark. By default the address is 236.10.10.10. The Spikemark IP Address *does not* have to be in the same range.

CLIENT PORT

Similar to client address, client port is the UDP port that Spikemark will send data over. By default the port number is set to 56565.

SERVER NAME

Spikemark is set up as a PSN Server and requires a name in order to announce itself to the PSN clients. By default, the name is Spikemark.

ACTIVE

When checked, the given axis' position will be sent. This allows Spikemark to selectively send position data. By default, active is unchecked.

MOTOR NAME

The name of the motor in Spikemark.

POSISTAGENET NAME

The name that the PSN clients will see. By default, the PosiStageNet name is the same as the motor name but can be changed as needed. This allows an axis to be called one name in Spikemark and another on a PSN client.

TYPE OF MOTION

There are two possible values for type of motion: Translating along or Rotating around. Type Of Motion is changed depending on the axis model type (winch, turntable, periaktos) noted in the Stage Model Viewer. The product of this is determining what chunk is being set for the given PSN tracker. When Translating along is displayed the position chunk is set, and when Rotating around is displayed the orientation chunk is set.

AXIS DIRECTION

The three possible values for Axis Direction. They are X, Y, or Z. By selecting one of these sets, the corresponding value in either the position chunk or the orientation chunk is used for the Axis Direction. By default, the Axis Direction is set to X.

DATA & INFO INTERVALS

- The Data Interval is the speed at which PSN data packets are sent.
- The Info Interval is the speed at which PSN info packets are sent. The Info Interval is not changeable but instead is calculated based on the Data Interval. The recommended fastest speed for the Data Interval is 30.

SEND OUTPUT

The Send Output button toggles the PosiStageNet server in Spikemark on or off.

OPEN SOUND CONTROL (OSC)

Open Sound Control (OSC) is an open protocol for transmitting data between computers. Spikemark can send these OSC messages to any device that supports UDP OSC such as QLab, ISADORA or ETC EOS. Additionally, Spikemark can send real time motor position data using the OSC protocol like it does with Watchout (<http://cci.fyi/watchout>) and PosiStageNet (<http://cci.fyi/psn>).

POSITION OUTPUT

Under the **Show Control** menu item click the 'OSC...' to bring up the OSC Position Output dialog, which will have the following options.

1. **Server Address**
2. **Server Port**
3. **Active**
4. **Address**
5. **Scaling**
6. **Update Interval**
7. **Send Output**

The screenshot shows the 'OSC Position Client' dialog box. It has a title bar 'OpenSoundControlDialog' and a subtitle 'OSC Position Client'. Below the subtitle are two input fields: 'Server Address' (containing '192.168.10.200') and 'Server Port' (containing '53000'). Below these is a table with columns: 'Active', 'Motor Name', 'Address', and 'Scaling'. The table contains five rows: 'SR wagon', 'CR tab', 'SL tab', 'Turntable', and 'SL wagon'. Each row has an unchecked checkbox in the 'Active' column and the value '1' in the 'Scaling' column. The 'Address' column for all rows contains '/cue/2/translationX'. Below the table is a field for 'Update Interval (ms):' set to '30' and 'Messages/second: 0'. At the bottom right is a 'Send Output' button.

SERVER ADDRESS

The client address is the IP address of the OSC client receiving position data from Spikemark.

SERVER PORT

Similar to client address, client port is the UDP port that Spikemark will send data to.

ACTIVE

When checked, the given axis' position will be sent. This allows Spikemark to selectively send position data. By default, active is unchecked.

ADDRESS

Address is the identifying information in an OSC message and always starts with a forward slash (/). By default it is set to '/cue/2/translationX' which is a QLab address for changing the horizontal position of a video cue. This can be changed on a per axis basis and can be any valid OSC address.

SCALING

Scaling is used to send larger or smaller position steps. It works by multiplying the scaling value by the axis' position. For example, if a motor is at a position of 100 and scaling is set to 1.5, the actual value sent will be 150. Scaling can be any number greater than zero (0) and defaults to one (1) which equates to no scaling.

UPDATE INTERVAL

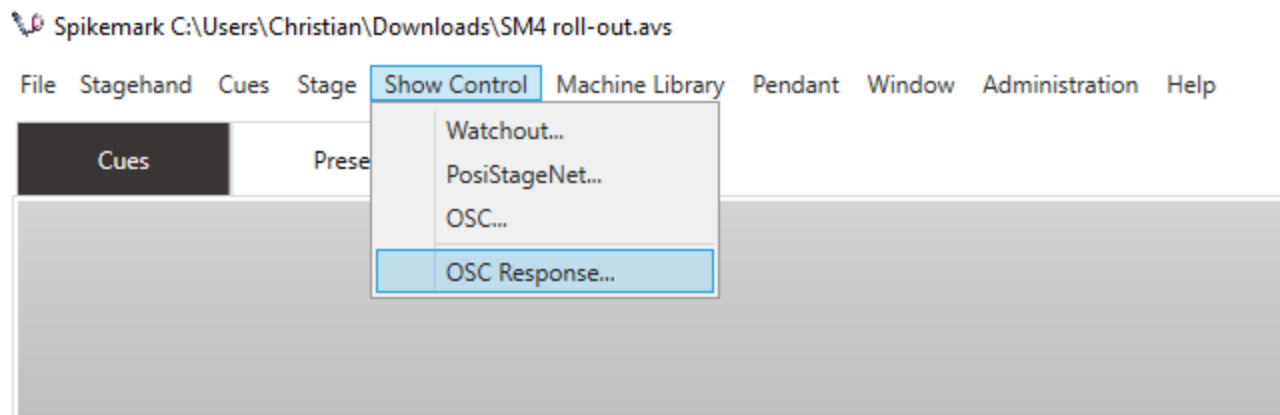
The update interval is the speed at which OSC packets are sent. The recommended fastest speed is 30.

SEND OUTPUT

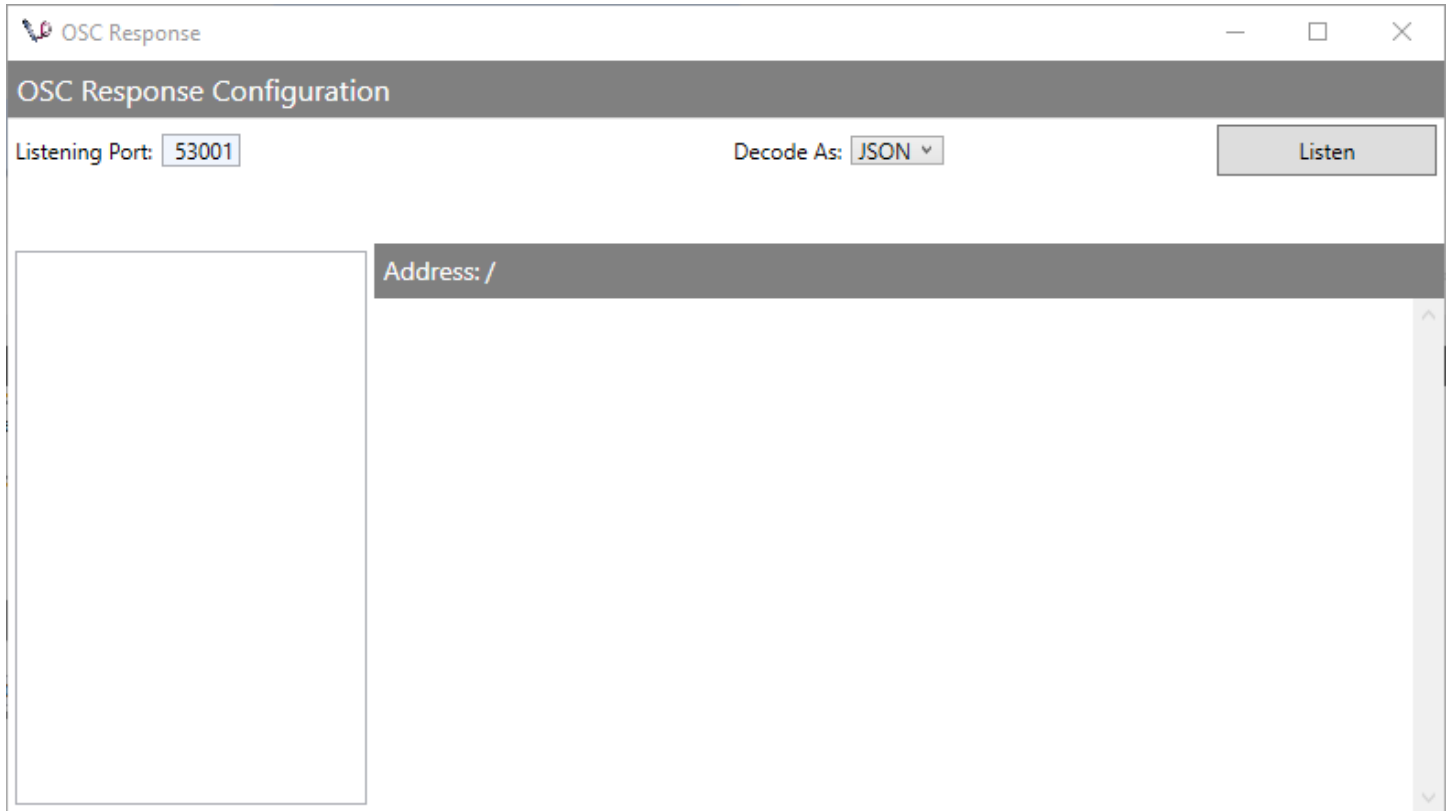
The send output button toggles the OSC client in Spikemark on or off.

OSC RESPONSE WINDOW

Sometimes OSC messages respond back and other times OSC messages can be used to query information. In either of these cases, Spikemark has the ability to receive these messages and display them. This is a great tool to use when troubleshooting if two devices are communicating via OSC. To access the response window in the menu bar, click **Show Control** and then click **OSC Response...**



This brings up the response dialog. In this dialog, the Listening Port is the UDP port Spikemark will listen for messages on. It can be any integer and it must correspond to the port number of an OSC client sending messages. Spikemark only listens for OSC messages when this dialog is open and the Listen button is pressed.



When an OSC message is received it is added to the messages list on the left. To view the contents of the OSC message click it. Depending on how the message is sent by the OSC client, you may want to adjust how you display the message since different OSC clients encode their message data differently. You can simply change how it is displayed in Spikemark by selecting Text, JSON, or ByteArray in the Decode As dropdown.

OSC Response Configuration

Listening Port:

Decode As:

Listen

1/28/2019 3:31:56 PM
/reply/cue/1/patchList

Address: /reply/cue/1/patchList

Argument Type: String

```
{
  "status": "ok",
  "data": [
    {
      "patchRouting": [
        1,
        2
      ],
      "patchNumber": 1,
      "patchName": "1 - Mac mini Speakers"
    },
    {
      "patchRouting": [],
      "patchNumber": 2,
      "patchName": "2 - (no device)"
    },
    {
      "patchRouting": [],
      "patchNumber": 3,
      "patchName": "3 - (no device)"
    },
    {
      "patchRouting": [],
      "patchNumber": 4,
      "patchName": "4 - (no device)"
    }
  ]
}
```

USING SPIKEMARK

Now that you have had an overview of Spikemark and know how to configure your machines, let's dig deeper into all the great features that make programming automation in Spikemark a breeze.

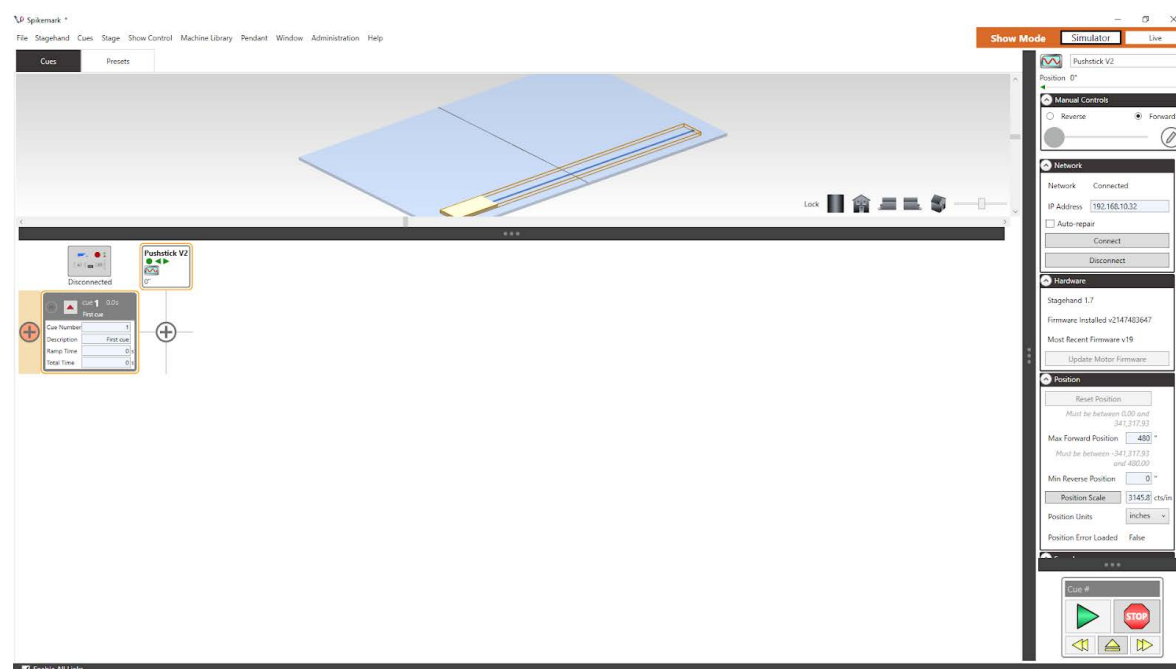
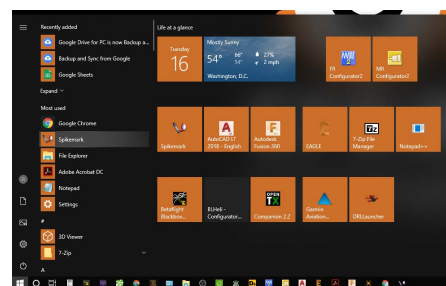
CREATING A NEW SHOW

Setting up a new show file is a straightforward process. However, this process can take a substantial amount of time to get setup just right. Let's look at the great tools for simplifying this process of creating a new show.

SPIKEMARK DEFAULT SHOW

In the Getting Around Spikemark section we briefly mentioned that the initial screen is pretty basic, with a Pushstick v2 and first Cue. This is the show file that opens by default unless another file has been chosen.

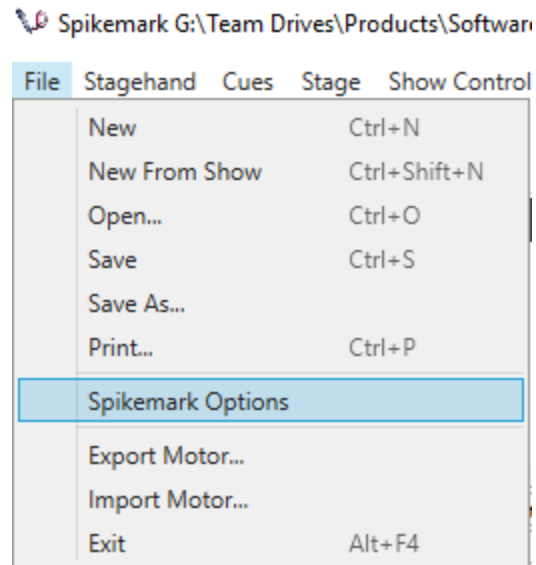
1. Simply, open Spikemark from your Desktop or Start Menu.



CUSTOM DEFAULT SHOW

You may find yourself setting up your workspace in Spikemark and configuring your motors the same across all your shows files. Creating a Custom Default Show can give you a template to start programming your show. When you open Spikemark, this Default Show file you just created will open directly to that show file without specifically finding and selecting that file every time.

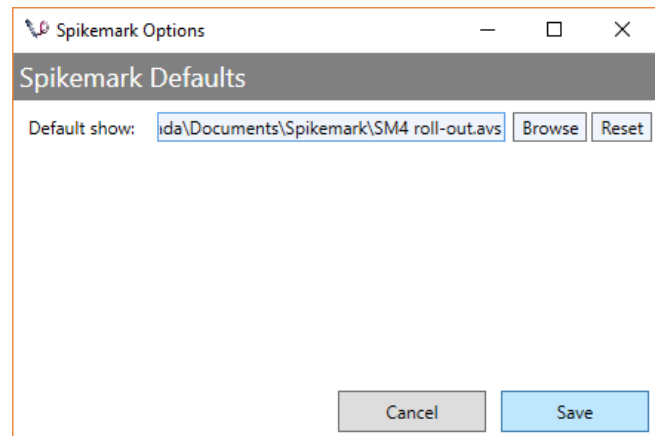
1. Click on **File** in the Menu Bar and select Spikemark Options. This will open the Spikemark Defaults window.



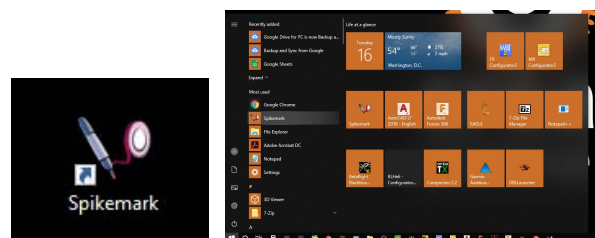
2. Select Browse, and this will open a Windows Explorer window where you can select the show file you would like to use as your default.

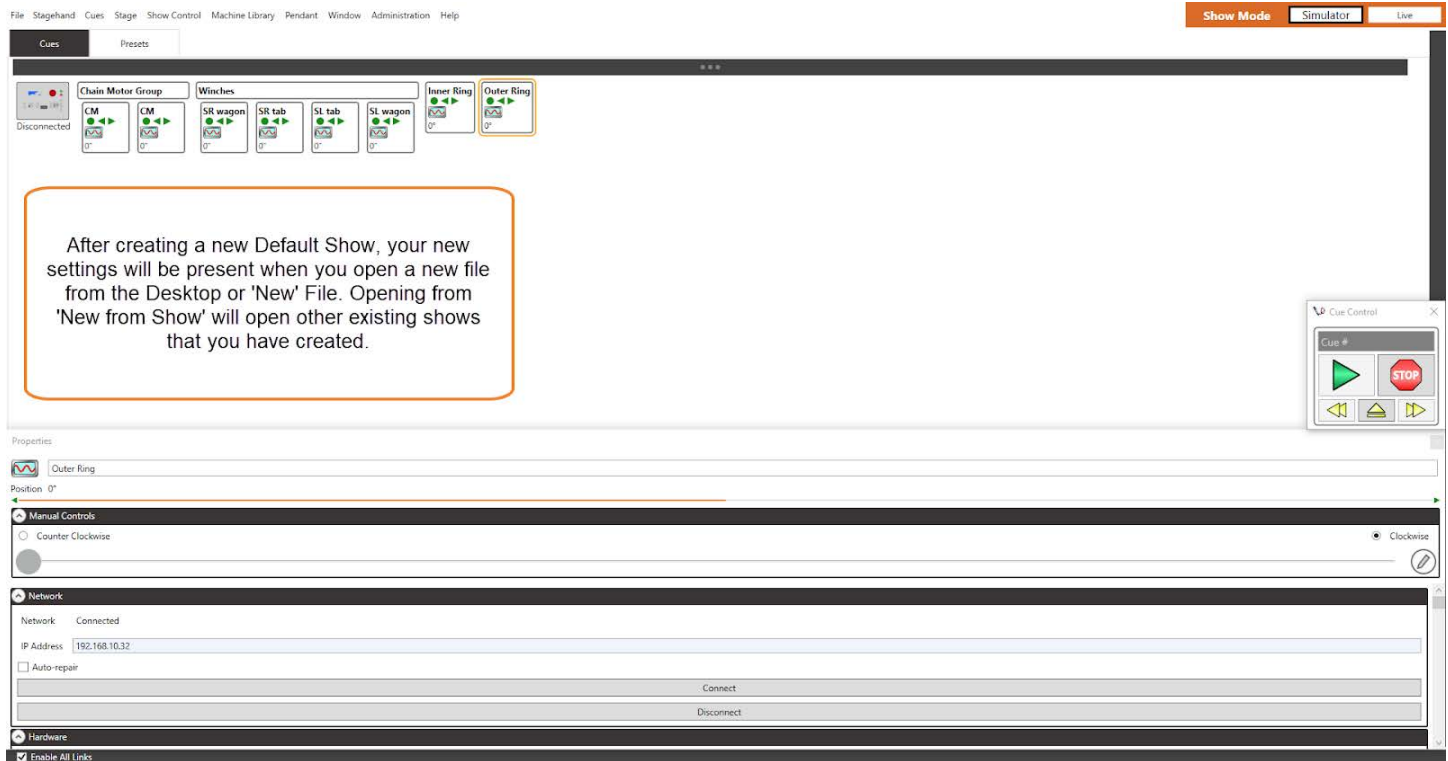
Once selected, the input field, next to 'Default Show,' will fill in the location of your show file.

Click Save and the Spikemark Defaults window will close. Once you close Spikemark and open it again, the new default show file will automatically open.



3. Open Spikemark from the Start Menu or Desktop Icon to open directly to your Custom Default Show.

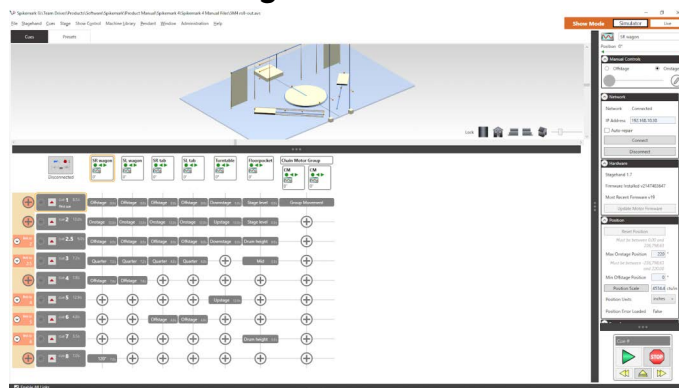




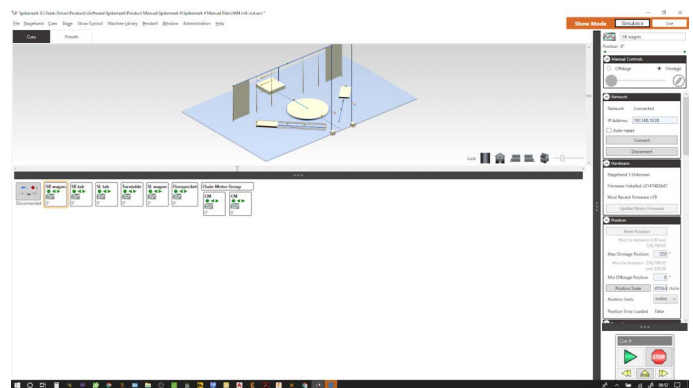
NEW FROM SHOW

If you are using the same machinery from an existing show file, try the New From Show option to start your new show file. By using this option, all of your motor configuration properties will transfer to your new show file with a clear cue grid ready for you to start programming cues. No need to reconfigure every motor for each new production.

Original Show File



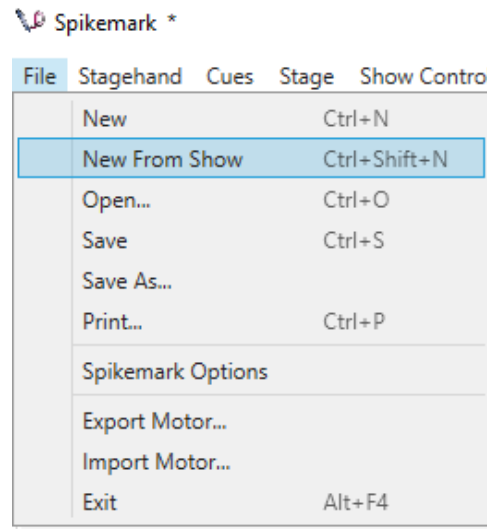
New from Show



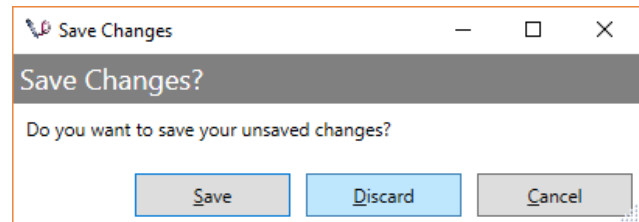
1. Open Spikemark.
2. Click on **File** in the Menu Bar.
3. Select New from Show to open the Windows Browser.

-- OR --

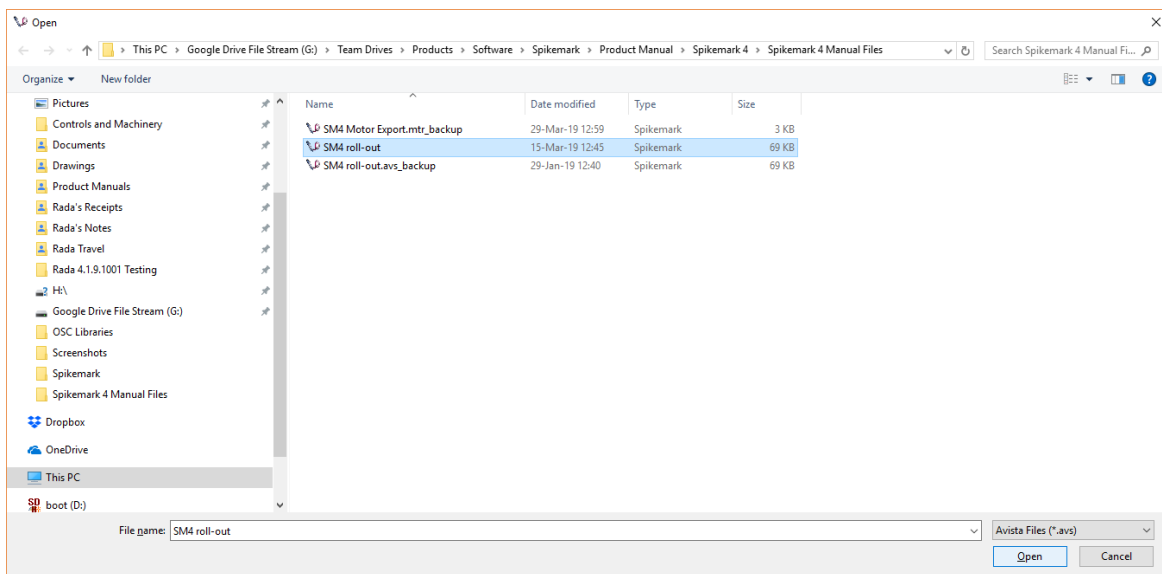
Use the hot key combination Ctrl+Shift+N.



4. Spikemark will ask if you want to save changes to your current file. In this demo, we opened directly to the Default Show, so there is no need, but if you're already working in an important show file, be sure to save any unsaved data!



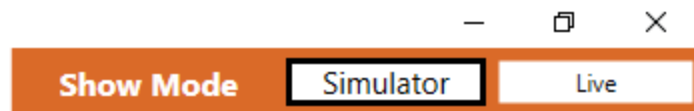
5. Navigate to your original show file, select it, and click Open. The new show file will automatically open.



MODE SELECTION

SHOW MODE SELECTION

Simulator, as the name suggests, simulates physical machinery on a virtual stage letting you run cues and jog scenery around without being connected to any physical motors. Simulator is a great way to get familiar with Spikemark without the need to set up heavy equipment. Simulator is also an excellent pre-visualization tool. You can use it to work through different cueing ideas at the tech table, in a design meeting, or on your couch. All of your hard work in simulator mode has paid off by simply switching to Live Mode. Live mode is where you will be able to control your physical machinery. You will need to be connected to your physical machinery through your Stagehands to see Spikemark control your effect in Live Mode.



MAIN SCREEN SELECTION

Just below the Menu Bar, you can find the Main Screen Selector. As mentioned before, there are two Main Screens that you can choose from. The Cues Tab will give you access to the Cue Grid, and Presets Tab will give you access to the Preset Grid.



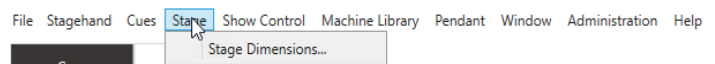
THE STAGE MODEL VIEWER

In this section, we'll go over how to configure the Stage Model Viewer so that your new motors appear correctly.

SETTING THE STAGE DIMENSIONS

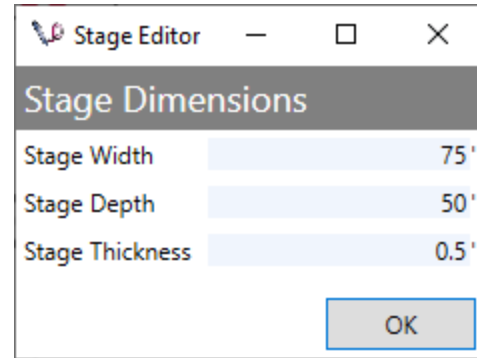
In the Stage Model Viewer, the stage is shown as a semi-transparent box. To make the stage in the Stage Model Viewer more closely resemble the size of your stage, you can change the default stage dimensions.

1. From the **Stage** menu, click Stage Dimensions.



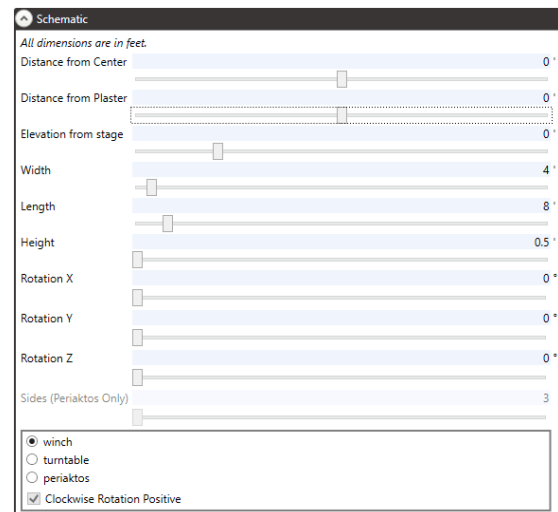
2. Edit the dimensions of the stage to match your physical stage and click OK.

(Note: All Stage Dimensions are in feet.)



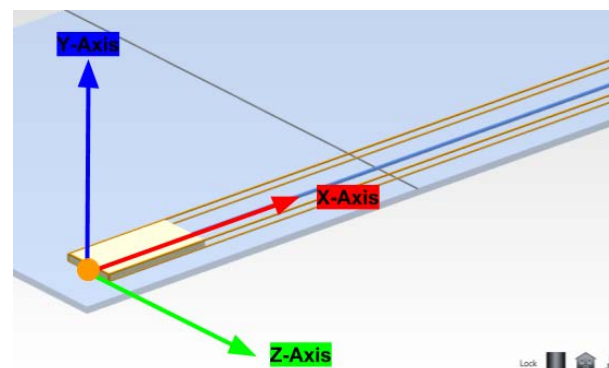
STAGE MODEL BASICS

Each motor you add can be easily modified to better reflect the size and shape of your scenery. With the Pushstick V2 selected, scroll down to the Schematic section of the Stagehand Properties panel located on the right of the screen.



By default, the Stage Model Viewer looks at the stage from House Left, so the Stage Right, Plaster Line corner is the closest point to your view. All of these variables reference a Zero Point which is by default at the bottom surface, and center of the Stage Right side of the unit.

We can best identify these points using X, Y, Z axes as references.

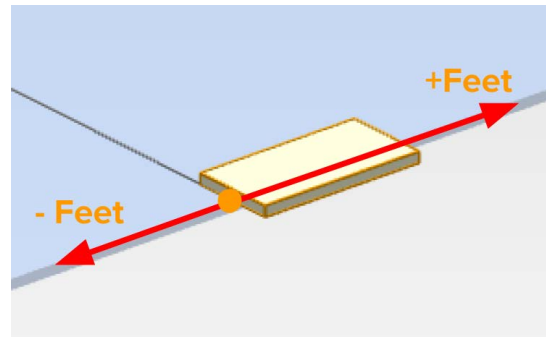


- **X-Axis** - Is a horizontal line running Stage Right to Stage Left.

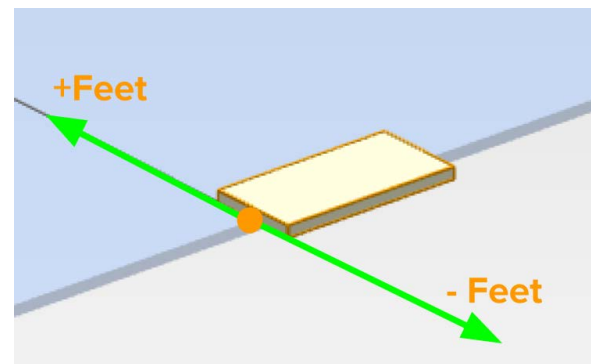
- **Y-Axis** - Is a vertical line running Up and Down.
- **Z-Axis** - Is a horizontal line running Up Stage to Down Stage.
- **Zero Point** - The orange dot represents the Zero Point of our unit where all schematic dimensions are measured. Note that it is on the bottom surface, and at the center of the Stage Right side.

⇒ **Distance from Center** - This number is the distance away from the Centerline in feet. A negative number will move the Zero Point towards Stage Right, and a positive number will move the Zero Point towards Stage Left.

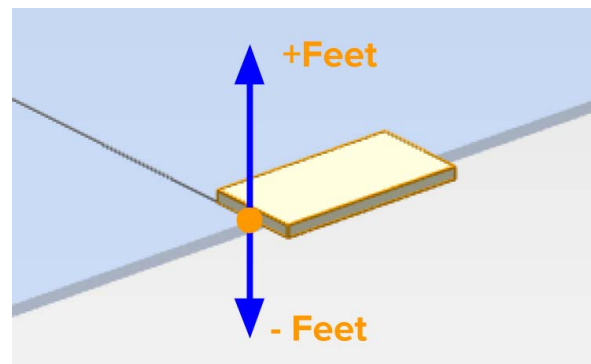
This example is at "0" indicating it is ON the Centerline.



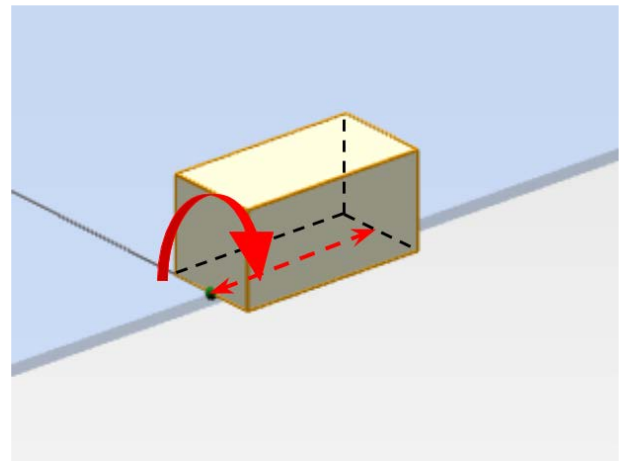
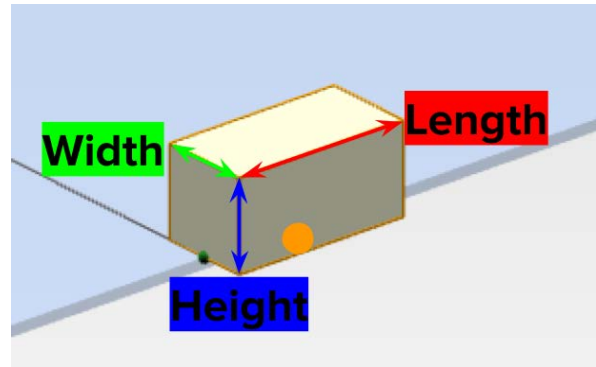
⇒ **Distance from Plaster** - A positive number will move the unit further Up Stage. Note that the Zero Point is at the center of the unit, so you'll need to calculate the location of the Down Stage edge by subtracting $\frac{1}{2}$ the unit width from your Distance from Plaster.



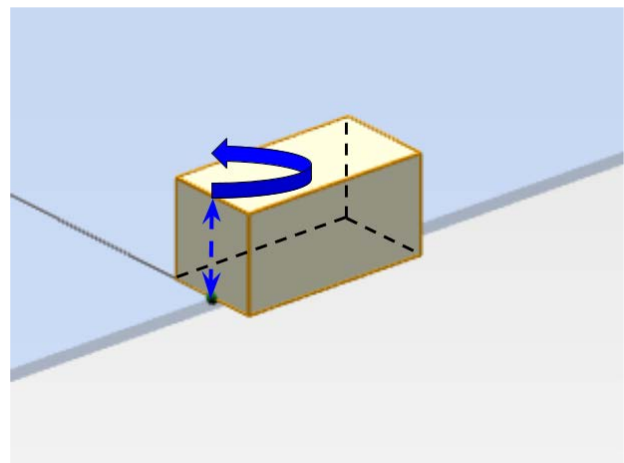
⇒ **Elevation from Stage** - This number moves the Zero Point up and down from the upper surface of the Stage. A negative number moves the Zero Point below the stage, and a positive number moves the Zero Point above the stage. This is especially useful for traveler tracks and elevators that don't typically sit on the deck.



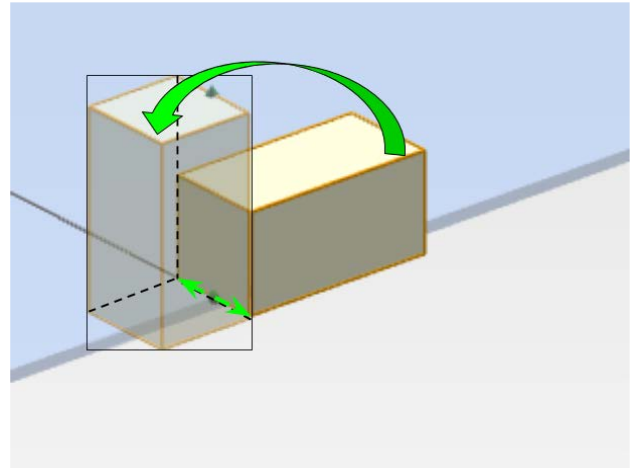
- ⇒ **Width** - The width changes the distance equally along the Z-Axis from the Zero Point. By default, this is in the Up Stage/ Down Stage direction.
- ⇒ **Length** - Unlike width, the length starts at the Zero Point and only moves in one direction along the X-Axis, or Stage Left to Stage Right by default.
- ⇒ **Height** - Similar to length, the height starts at the Zero Point and moves in one direction along the Y-Axis.
- ⇒ **Rotation X** - Rotates the unit around the X-Axis. Imagine tumbling up or down stage.



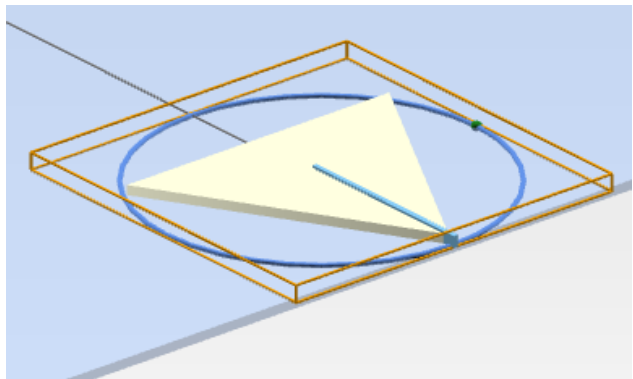
- ⇒ **Rotation Y** - Rotates the unit around the Y-Axis. Imagine swinging around a flagpole.



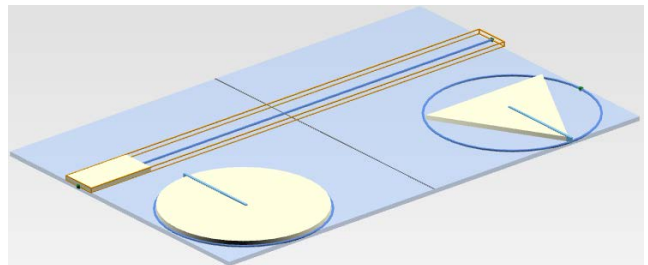
⇒ **Rotation Z** - Rotates the unit around the Z-Axis. Imagine a trap door opening from Stage Left to Stage Right.



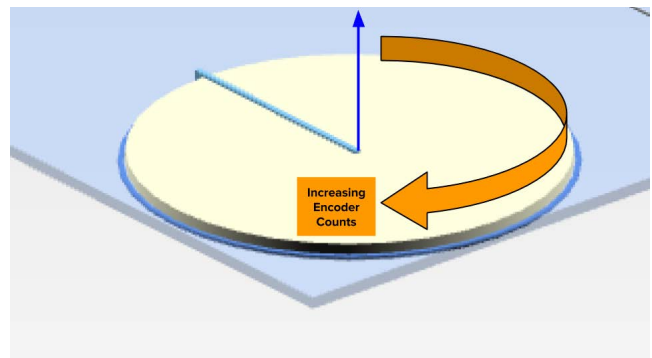
⇒ **Sides (Periakto Only)** - This is only active when the Periakto function (#11 to the right) is selected, and lets you determine how many sides your unit will have.



⇒ **Winch/Turntable/Periakto** - Select whether the unit functions as a winch - simply tracking along one movement plane, as a turntable - a cylinder spinning around a center pivot, or a periakto - a multi-sided turntable spinning around a center pivot.



⇒ **Clockwise Rotation Positive** - By default, a turntable or periakto will increase encoder counts when spinning in a clockwise direction. Deselect this box to decrease encoder counts when spinning in a clockwise direction.

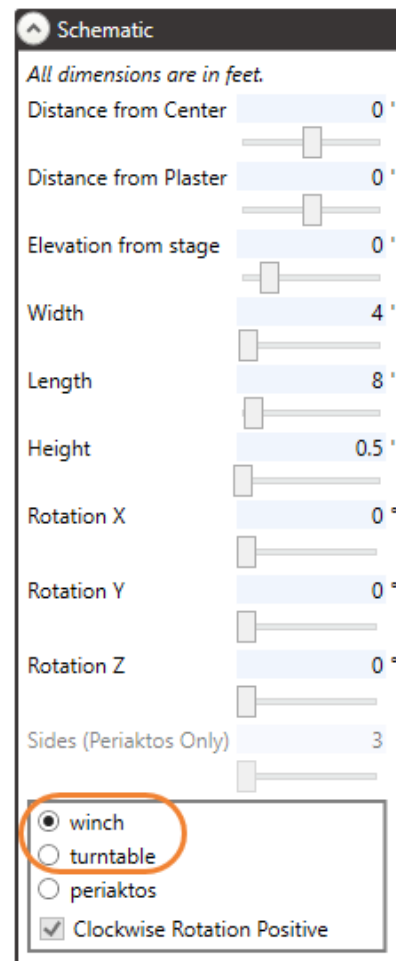


MAKING A WINCH MODEL

After you've changed the size of the stage to match your theatre space, the next step is to make the motors look roughly like the scenery on the stage. Each motor in the show can be viewed as either a winch or a turntable. You may be thinking, we can automate more scenery than just a winch or a turntable so how would I visualize these other machines. You would be correct. However, a winch in the model can be modified and visualized as a lift, hoist, curtain, winch, or any machinery that runs in a straight line. Winches always look like a box traveling along a track. This box is used to resemble your scenic wagon. The length of the track is determined by the Max Forward and Min Reverse input fields (set in the **Position** section of the **Stagehand Properties Panel**). The size and placement of the scenery on the track can be adjusted in the **Schematic** section of the Stagehand Properties Panel. Let's go over the steps to achieve this.

1. Select the motor you wish to adjust in the **Cue Grid**.
2. In the **Stagehand Properties Panel**, scroll to the **Schematic** pane and make sure that Winch is selected at the bottom of the **Schematic** pane.

(Note: Adding a Turntable is described in the "Making a Turntable Model" section on page [--](#))



3. Adjust the Width, Length, and Height properties to change the look of your wagon by using either the sliders beneath each text field of the **Schematic** pane or you can type in a dimension directly into the input field. As you change the dimensions, the winch model in the Stage Model Viewer will update.

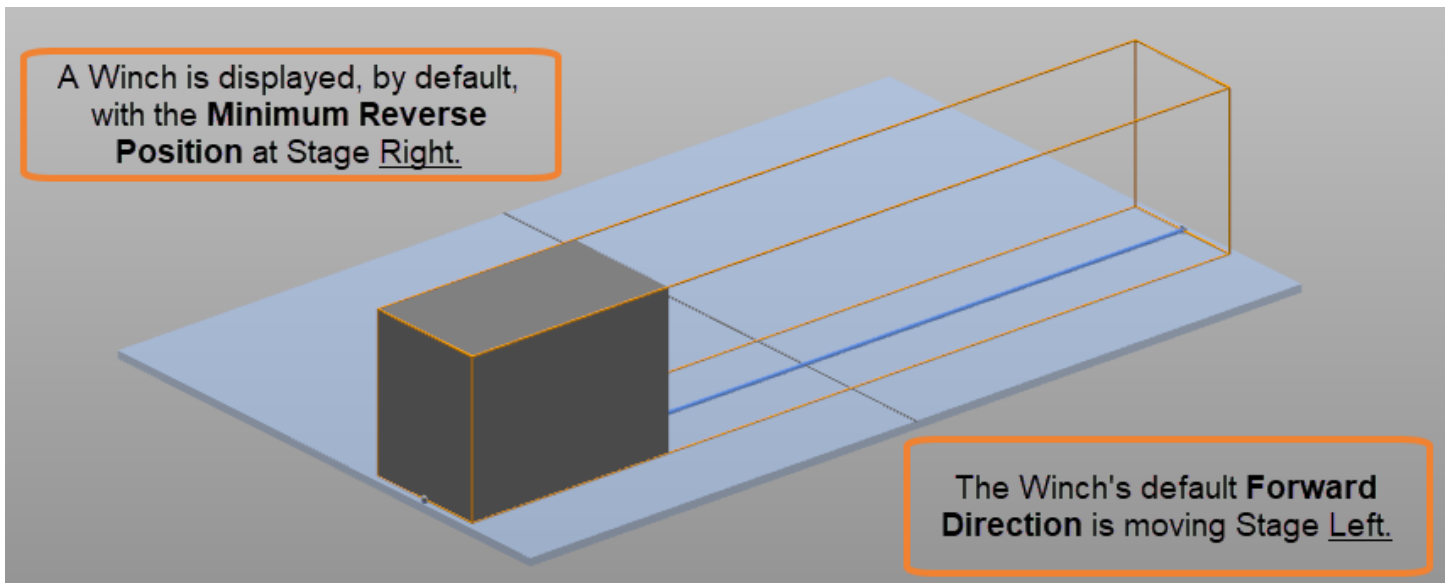
(Note: All dimensions are given in feet. This unit cannot be changed.)

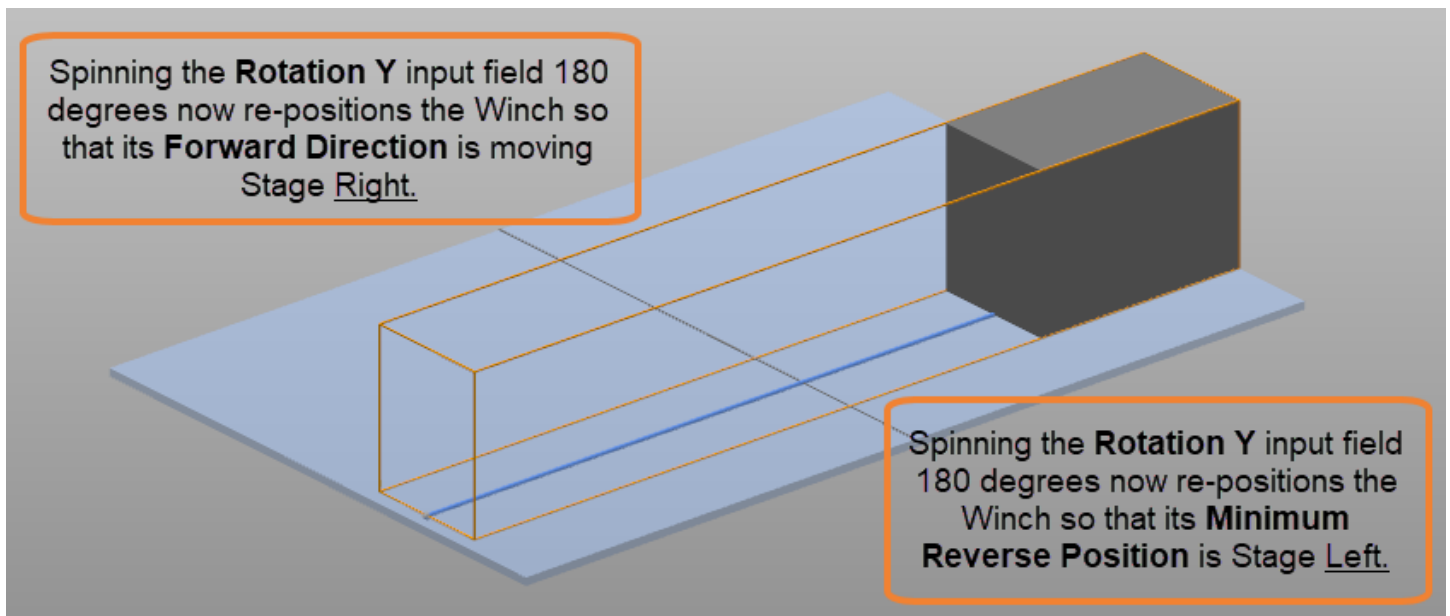
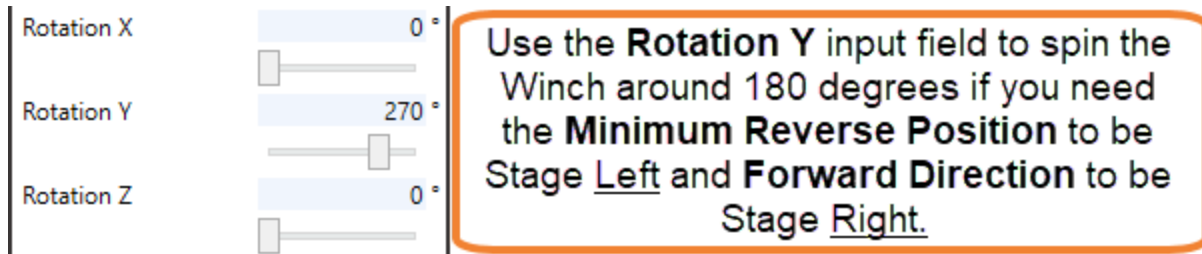
Width	8'
Length	14'
Height	10'

4. Now, move the winch into position so that it matches your stage.

Use the Distance from Center, Distance from Plaster, and Elevation from stage field sliders to change the location of your winch in relation to the stage. You can then fine tune the position by typing in accurate dimensions from your ground plan.

Distance from Center	-22.75'
Distance from Plaster	9.5'
Elevation from stage	0'





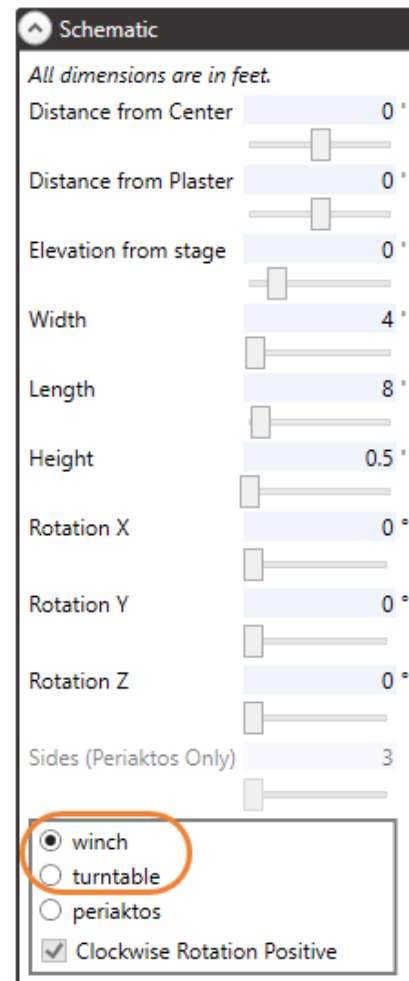
MAKING A LIFT MODEL

The winch-style model can be used to represent various machines other than ordinary deck winches. By adjusting the size and rotation of the winch we can easily make it look like a lift. Let's look at the steps to build a lift model by modifying the winch model.

1. Select the motor you wish to adjust in the **Cue Grid**.

- In the **Stagehand Properties Panel**, scroll until you find the **Schematic** section and make sure that Winch is selected at the bottom.

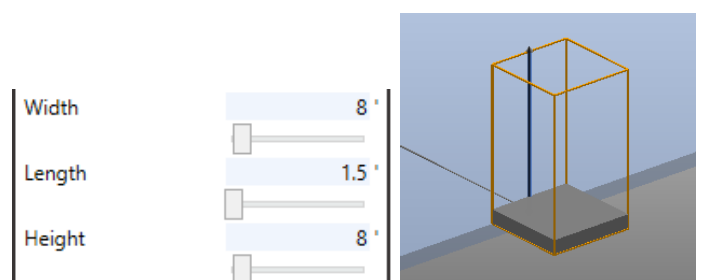
(Note: Adding a Turntable is described in the “Making a Turntable Model” section on page --)



- Using the Rotation X and Rotation Z sliders, rotate the winch model until it is standing upright.

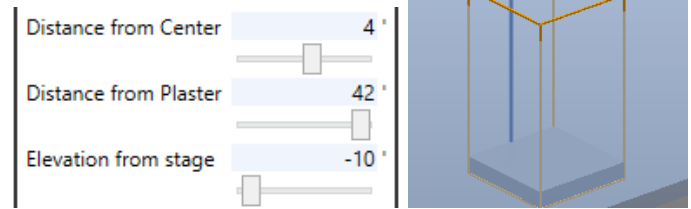


- Now use the Width, Length, and Height sliders to make the winch look like a lift platform.



5. Using the Elevation from stage field, position the Lift so that it travels into the trap room.

Use the Distance from Center and Distance from Plaster input fields to place your Lift in the appropriate part of your stage.



NOTE:

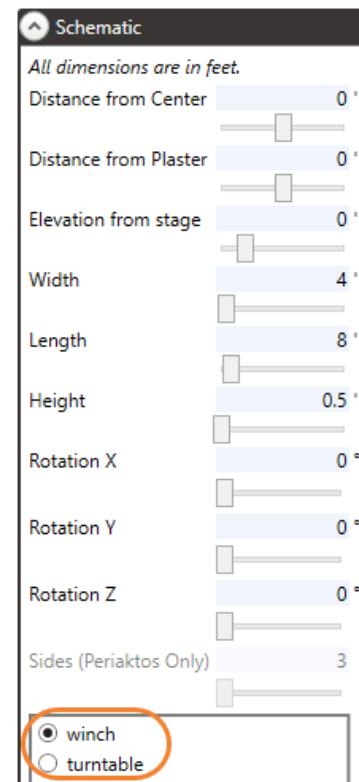
The stage is semi-transparent so that you can see scenery moving, even when it is beneath the stage.

MAKING A HOIST MODEL

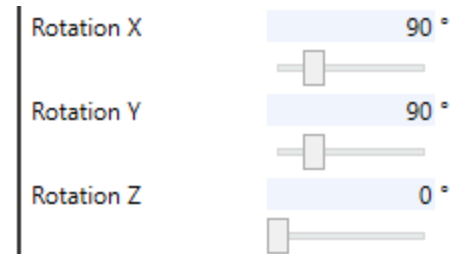
As you saw with a lift, the winch-style model can be used to represent various machines other than ordinary deck winches. By adjusting the size and rotation of the winch we can also make it look like a hoist. Let's look at how we achieve that type of model for a hoist.

1. Select the motor you wish to adjust in the **Cue Grid**.
2. In the **Stagehand Properties Panel**, scroll until you find the **Schematic** section and make sure that Winch is selected at the bottom.

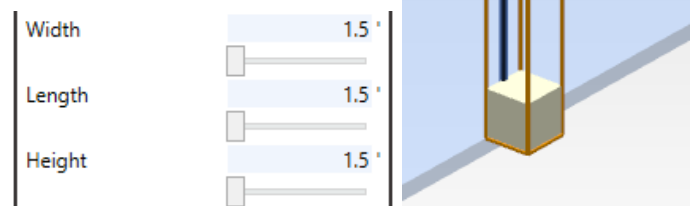
(Note: Adding a Turntable is described in the "Making a Turntable Model" section on page 275)



- Using the Rotation X and Rotation Y sliders, rotate the winch model until it is standing upright.



- Now use the Width, Length, and Height sliders to make the winch look like the scenic piece you are hoisting.



- Using the Elevation from stage field, position the hoist so it is at your minimum height of your hoist is above the stage.

Use the Distance from Center and Distance from Plaster fields to place your hoist in the appropriate part of your stage.



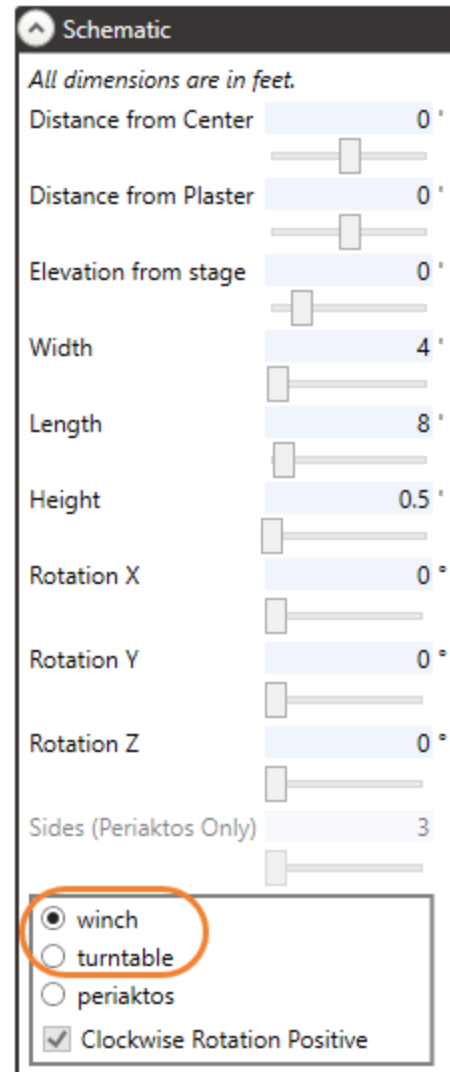
MAKING A CURTAIN MODEL

Creating a curtain model, like the lift and hoist models, is achieved by using the winch-style model like we have seen above. By adjusting the size and rotation of the winch, we can easily make the model look like a curtain is traveling on and off stage or a curtain flying in and out of stage.

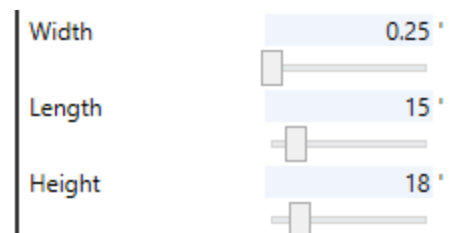
- Select the motor you wish to adjust in the **Cue Grid**.

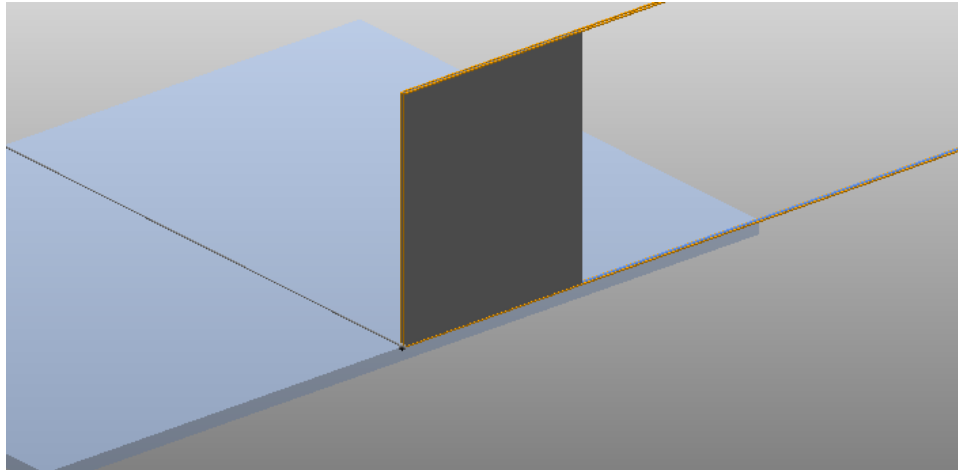
2. Scroll to the **Schematic** section of the **Stagehand Properties Panel** and make sure that Winch is selected at the bottom of the list.

(Note: Adding a Turntable is described in the “Making a Turntable Model” section on page --)



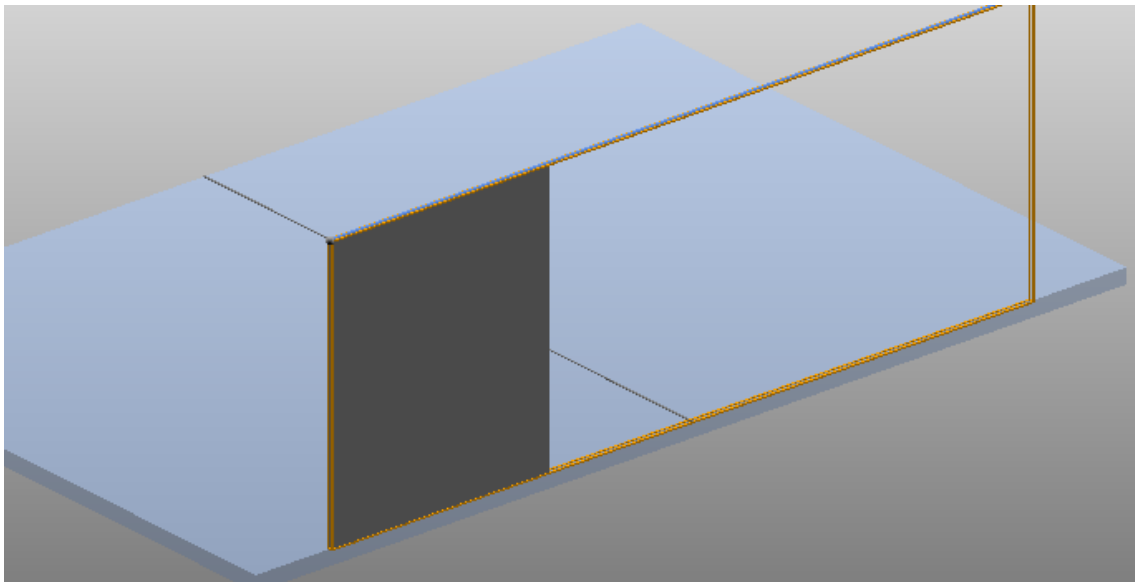
3. Adjust the Width, Length, and Height properties to make a tall, thin curtain.





4. Using the Distance from Center, Distance from Plaster and Elevation from Stage fields, position the curtain on the stage.

Distance from Center	27'
Distance from Plaster	0'
Elevation from stage	18'



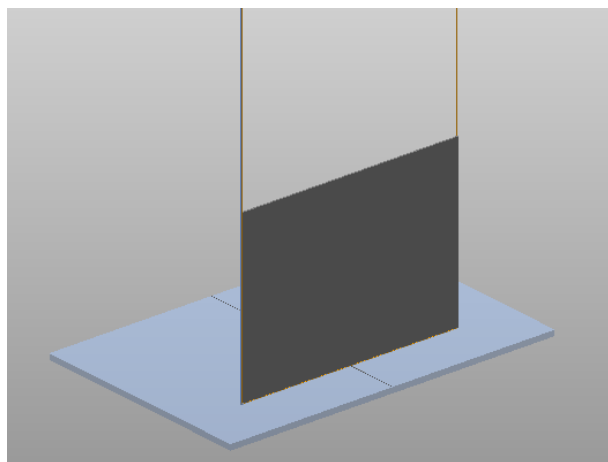
5. By adjusting the Rotation Z, Distance from Center, Distance from Plaster, Length and Height fields, you can change the horizontal traveler curtain into a vertical flying curtain.

Schematic

All dimensions are in feet.

Distance from Center	-20'
Distance from Plaster	0'
Elevation from stage	0'
Width	0.25'
Length	15'
Height	40'
Rotation X	180°
Rotation Y	0°
Rotation Z	90°
Sides (Periakto Only)	3

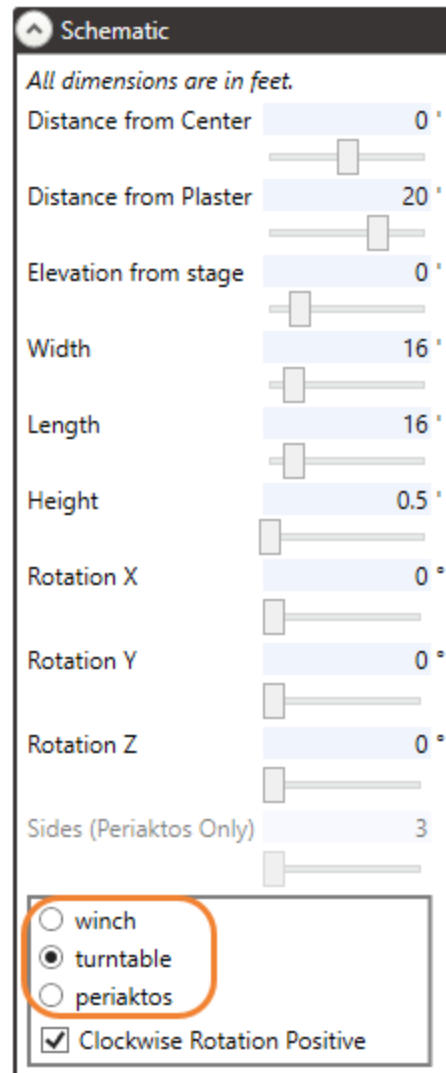
☒ winch
☐ turntable
☐ periaktos
☒ Clockwise Rotation Positive



MAKING A TURNTABLE MODEL

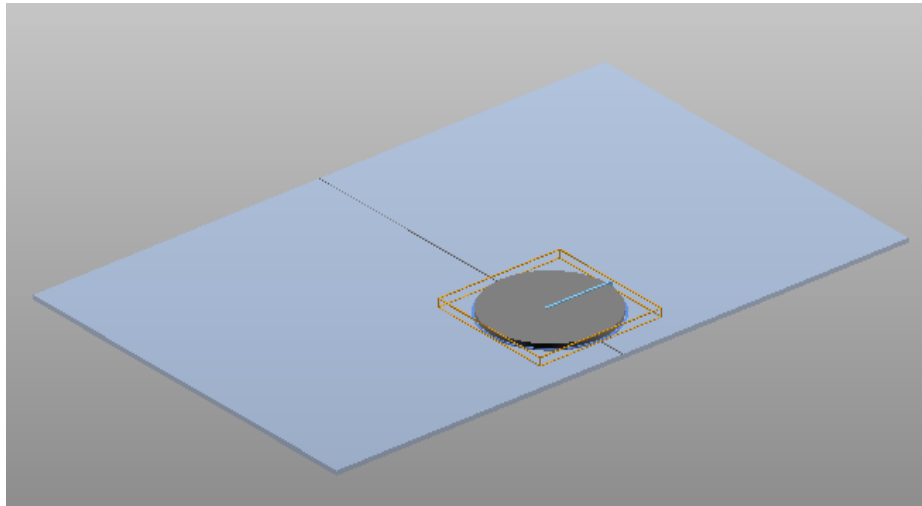
The default model style for every motor in the show is a winch, which moves linearly along a track. This works great for deck winches, lifts, hoists, and curtains which all move in a linear fashion. However, a lot of shows include turntables. Spikemark makes it easy to change a motor model from winch to turntable.

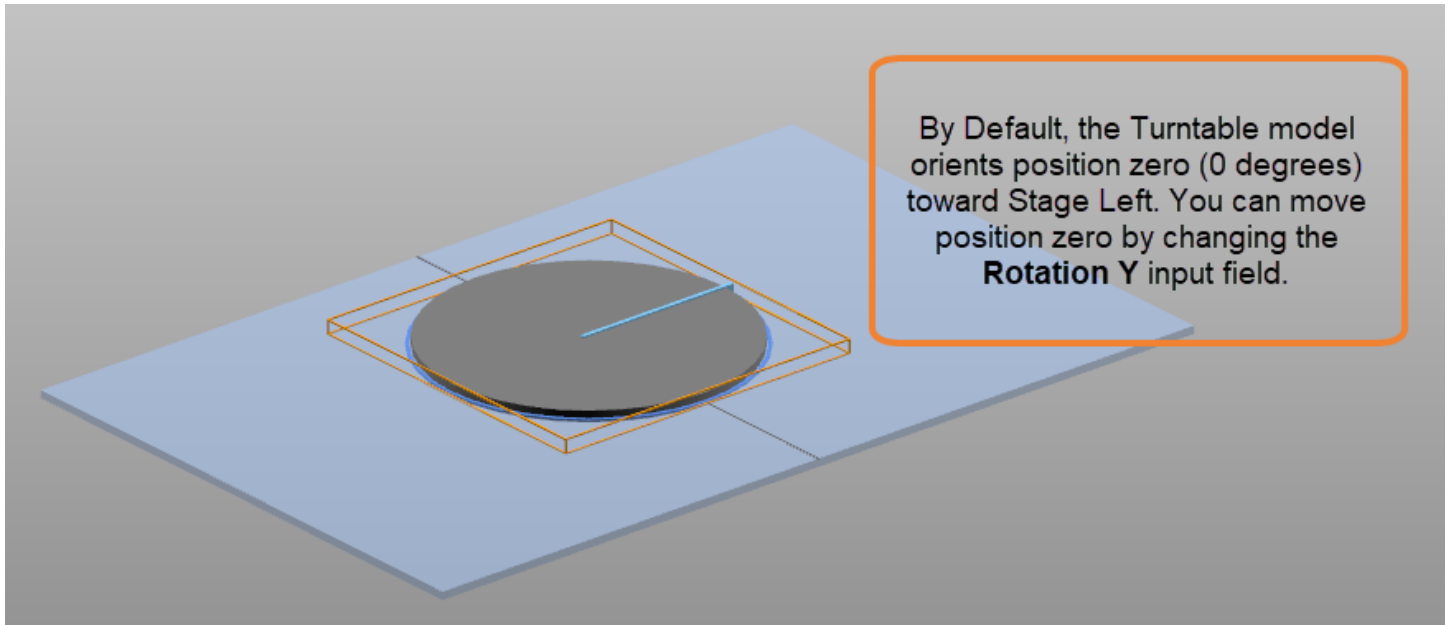
1. Select the motor you wish to adjust in the **Cue Grid**.
2. Scroll to the **Schematic** section of the **Stagehand Properties Panel** and select Turntable at the bottom of the screen.



- 3.** Use the Distance from Plaster and the Width sliders to position and resize the turntable.

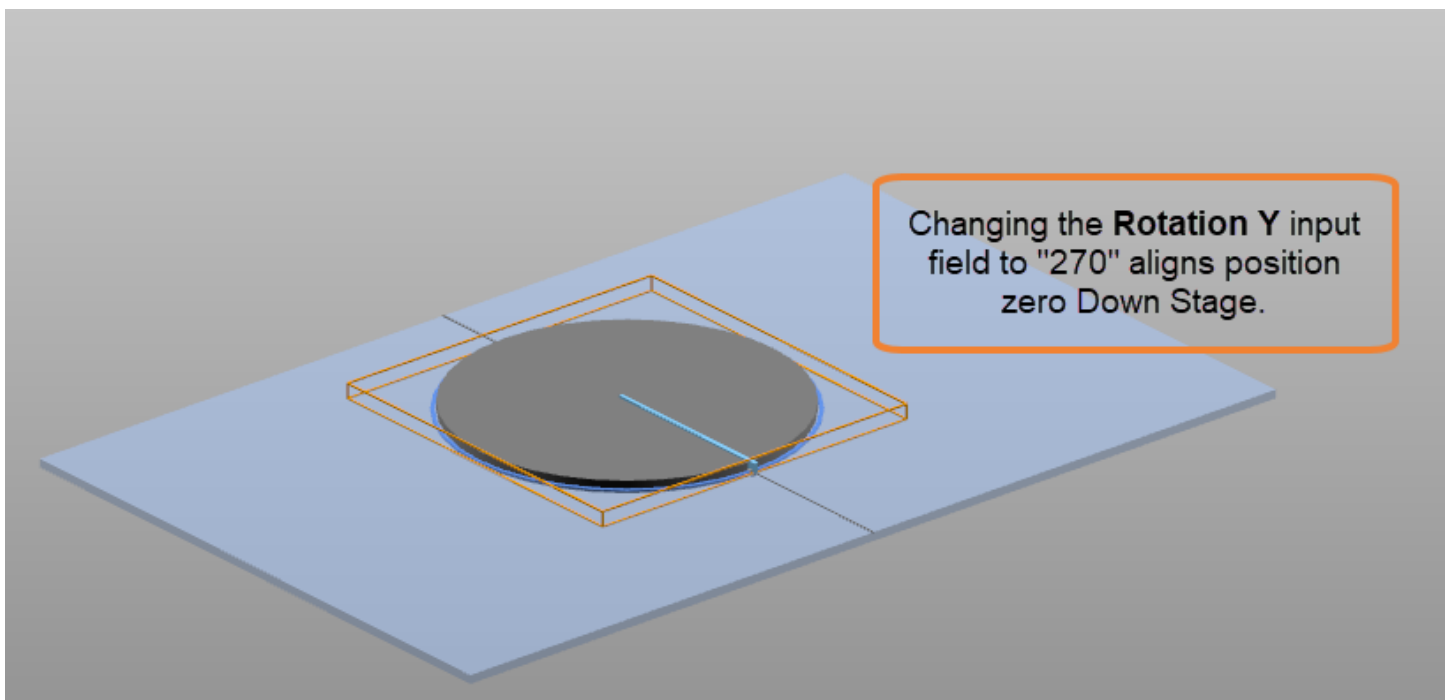
Distance from Plaster	<input type="text" value="20"/>
Elevation from stage	<input type="text" value="0"/>
Width	<input type="text" value="16"/>





Rotation X	<input type="text" value="0"/>
Rotation Y	<input type="text" value="270"/>
Rotation Z	<input type="text" value="0"/>

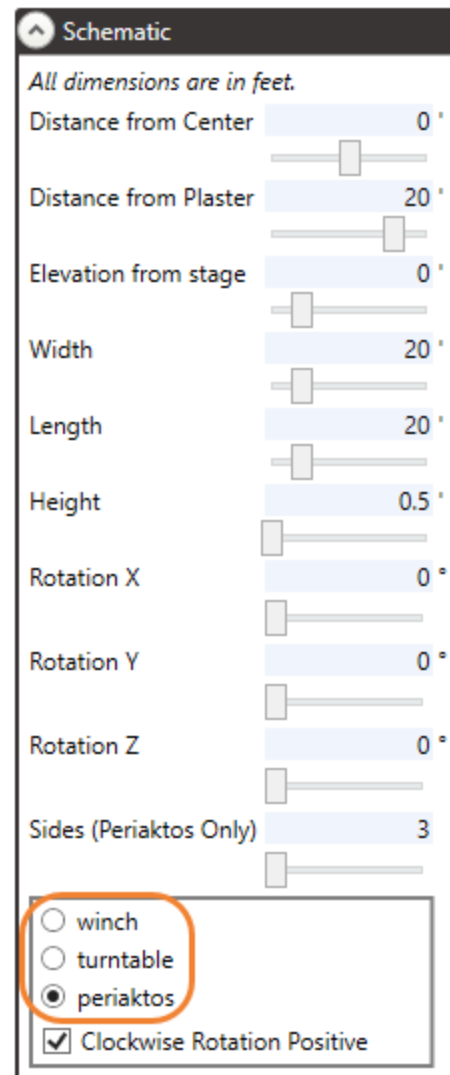
Use the **Rotation Y** input field to spin the position zero to wherever you need it on stage. *In this example, position zero will be at 270 degrees, or Down Stage.*



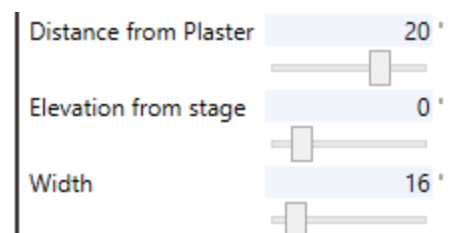
MAKING A PERIAKTOS MODEL

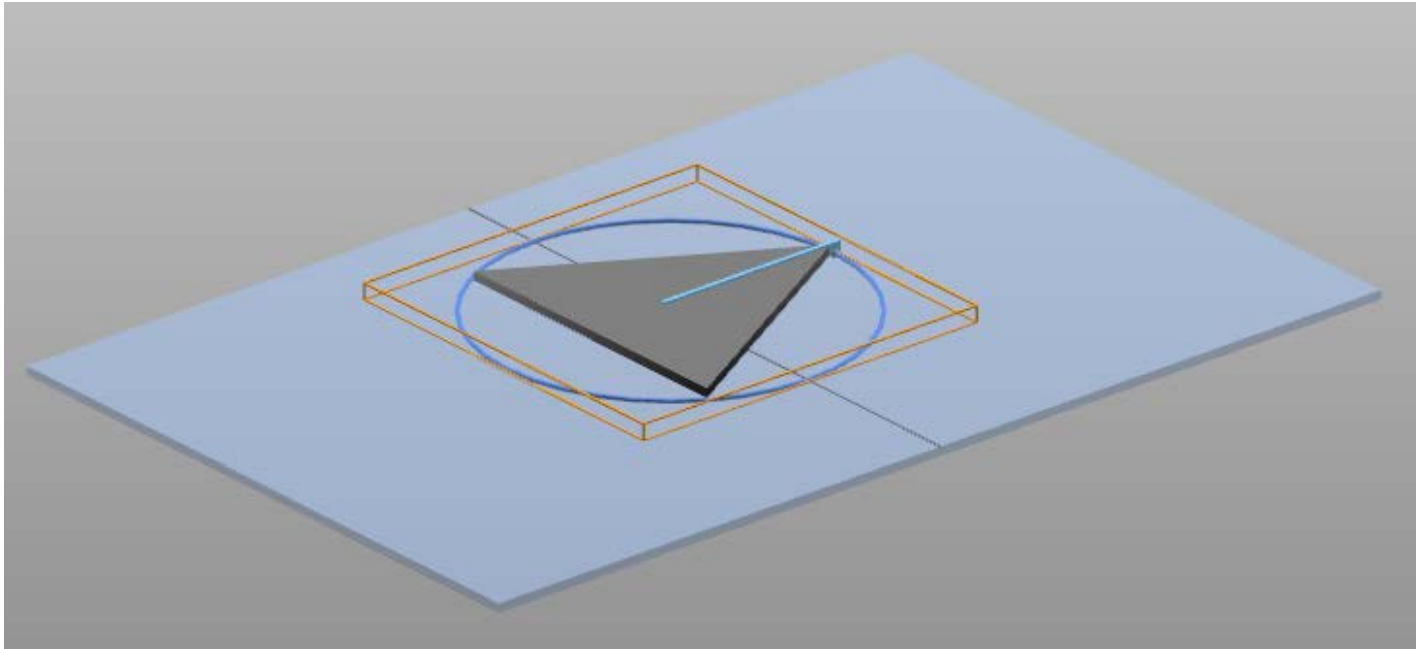
The Periaktos Model type is very similar to the turntable model type. However, we have added a few features to make visualizing Periaktos easier.

4. Select the motor you wish to adjust in the **Cue Grid**.
5. Scroll to the **Schematic** section of the **Stagehand Properties Panel** and select Periaktos at the bottom of the screen.

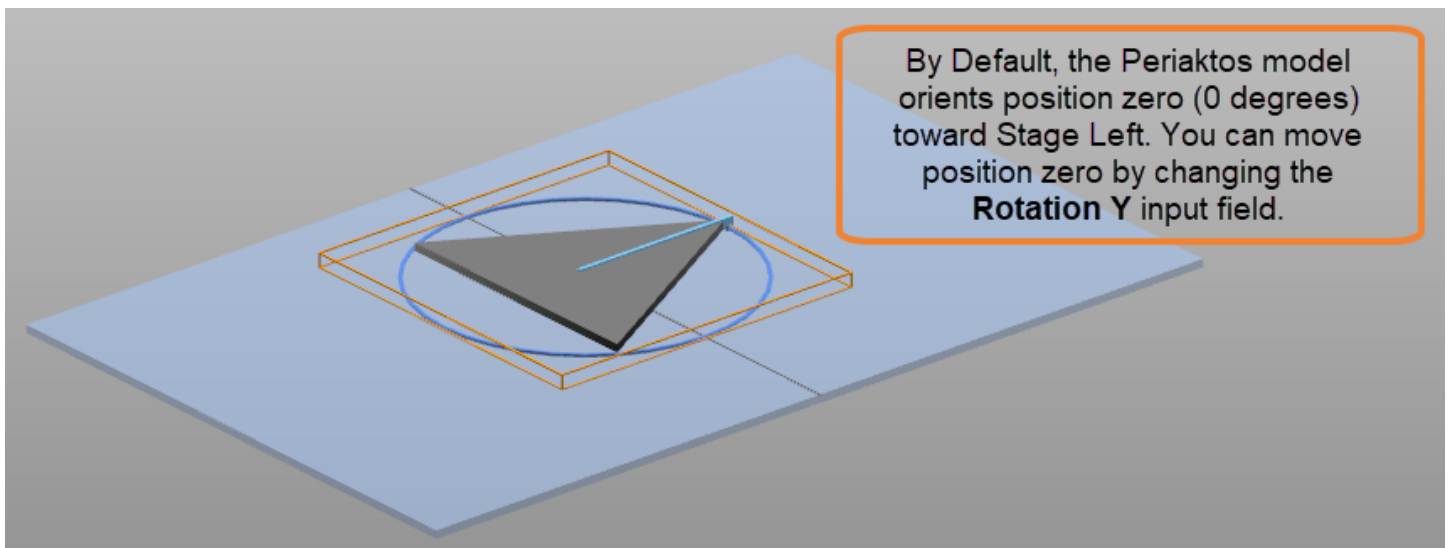


6. Use the Distance from Plaster and the Width sliders to position and resize the turntable.



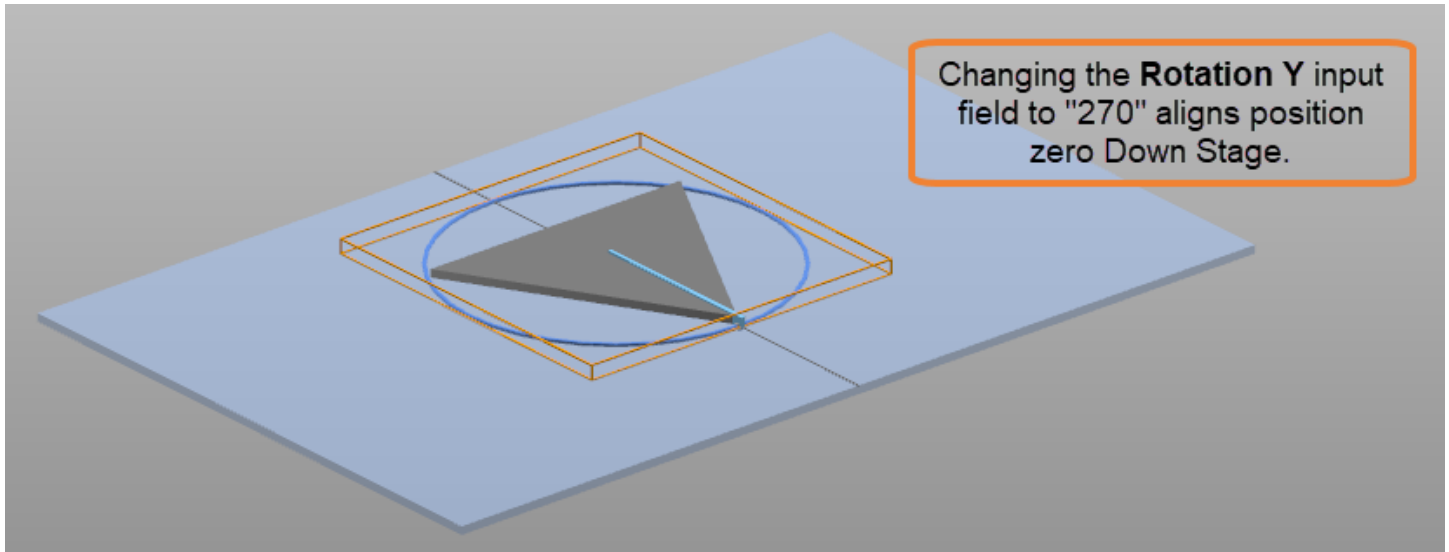


ROTATE THE MODEL



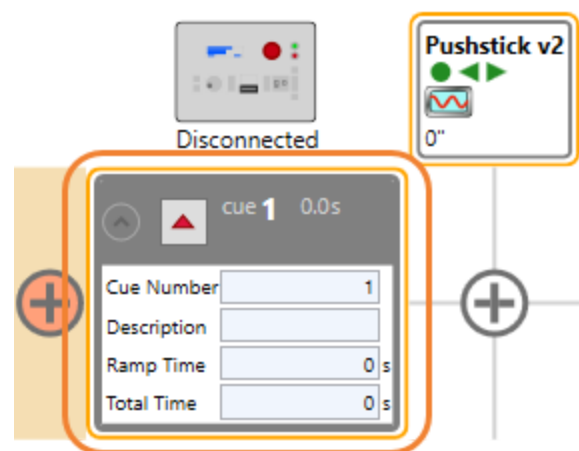
Rotation X	<input type="text" value="0"/>
Rotation Y	<input type="text" value="270"/>
Rotation Z	<input type="text" value="0"/>

Use the **Rotation Y** input field to spin the position zero to wherever you need it on stage. *In this example, position zero will be at 270 degrees, or Down Stage.*



CUES

A Cue is a collection of movements including any number of motors or FX outputs that all start when you press the GO button on the Consolette or on the Cue Controller. You can have an unlimited number of cues to your show. Each cue has a cue number that can be any decimal number, allowing for 'point cues' (*for example: 1.5, 209.52, etc.*). Spikemark displays all the cues in the show in the Cue Grid as rows sorted by Cue Number. When Spikemark is first launched, a single cue, Cue 1, is created by default. You can use this cue as a starting point or delete it and start with a blank slate.



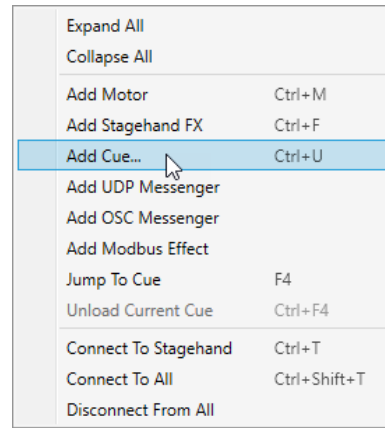
NOTE:

You can write cues with or without being connected to any Stagehand Motors or FXs. You can “rough in” all of your cues before setting up your motors on stage. By using the Spikes feature and a scaled ground plan, you can write all of the cues for the show and then tweak final positions when the scenery is installed (see the “Spikes” section for more details).

ADDING A CUE

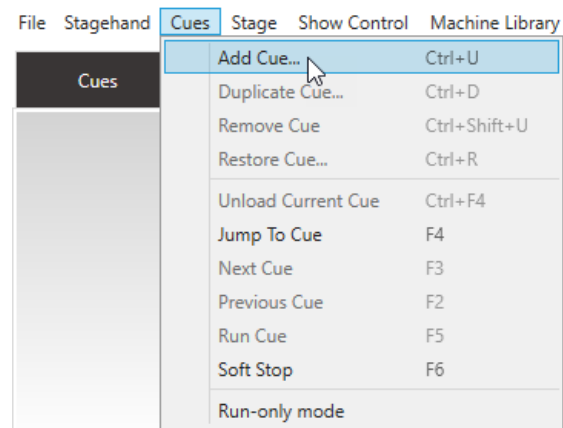
There are three ways to add cues to your show:

1. Right-click on a blank area in the **Cue Grid** and select Add Cue.



-- OR --

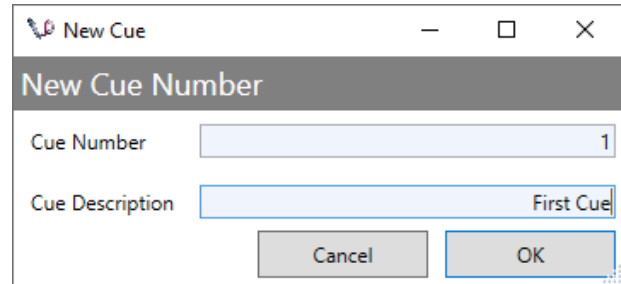
2. In the **Cues** menu, click Add Cue.



-- OR --

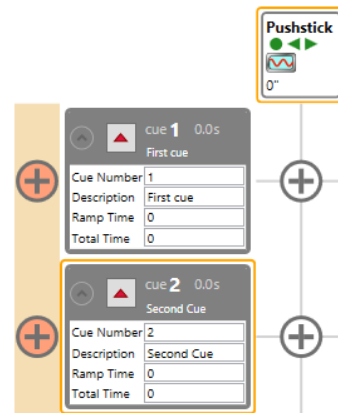
3. Use the keyboard shortcut **Ctrl + U**.

4. A dialog appears prompting you for a Cue Number and Cue Description.



The 'New Cue' dialog box is shown. It has a title bar with a small icon and the text 'New Cue'. Below the title bar is a section titled 'New Cue Number'. Inside this section, there are two input fields: 'Cue Number' with the value '1' and 'Cue Description' with the value 'First Cue'. At the bottom right of the dialog are two buttons: 'Cancel' and 'OK'.

5. The newly created cue will appear in the Cue Grid.



NOTE:

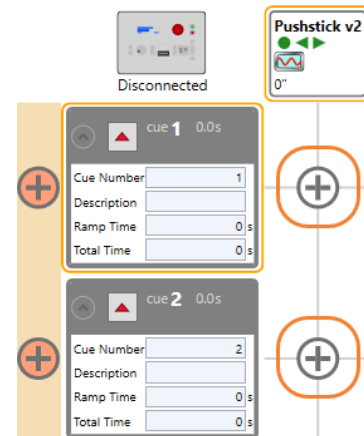
You can edit the Cue Number or accept the default. The default cue number is the next highest whole number. If your highest cue number is 10, the default new cue number will be 11 - if your highest cue number is 1001.5 the next cue number will be 1002.5

The Cue Description is solely for your benefit. You can enter a descriptive name to help identify the cue in the Cue Grid. Editing the description in the Cue Grid will allow you to enter multiple lines to the cue description - which is very handy when noting cue light colors or Act then Scene references.

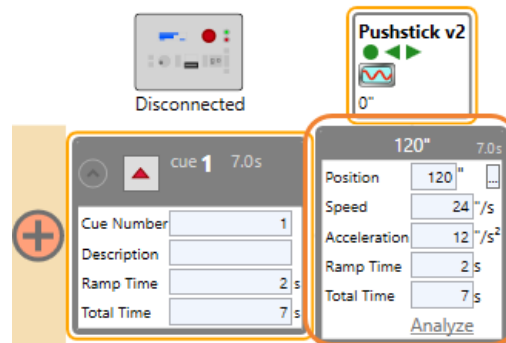
ADDING MOTOR MOVEMENTS TO A CUE

What is automation without movement? Probably broken! Since it is so integral to just about everything that we do, creating movements in Spikemark is very simple.

1. Press the “+” button that is displayed at the intersection of the cue row and the desired motor column.



2. After you press the “+” button, a movement will appear displaying the default values for the motor in the cue.



MOTOR MOVEMENT INPUT FIELDS

POSITION

Position is the target position where you want the motor to go. This number is displayed in scaled units (inches, feet, degrees, etc.). By default, Spikemark uses the current position of the motor as the target position. The button to the right of the Position text box will bring up the Spike Selection window. By default, this button will be displayed as "...". If you have a Spike selected for your position, the button will display the name of the Spike. Spikes are discussed in the "Spikes" section below.

A screenshot of a motor movement control interface. At the top, it shows '45"' and '3.9 s'. Below this are five input fields: 'Position' (45"), 'Speed' (24"/s), 'Acceleration' (12"/s²), 'Ramp Time' (2 s), and 'Total Time' (3.87 s). An orange oval highlights the 'Position' field and its dropdown arrow button. At the bottom right is an 'Analyze' button.

SPEED

Speed indicates the speed at which you want the motor to travel. This number is displayed in units per second (inches/sec, degrees/sec, etc.). You can synchronize multiple motors by programming them at the same speed, regardless of gearing and encoder differences. Valid speed values are greater than zero and no greater than the Max Speed, as defined in the Speed section of the Stagehand Properties Panel. Spikemark initially uses the Default Speed, also defined in the Speed tab of the Stagehand Properties Panel.

A screenshot of the same motor movement control interface. An orange oval highlights the 'Speed' field, which contains the value '24"/s'.

ACCELERATION

Acceleration indicates the rate at which the speed will increase as the motor moves. This number is displayed in units per second per second (inches/sec/sec, etc.). A higher value will cause the motor to accelerate more quickly giving the motion more snap at the beginning and end of the cue. A lower value will cause the motor to accelerate more slowly and smoothly. Valid acceleration values range from greater than zero to no greater than the programmed Speed value. Spikemark initially uses the Default Acceleration defined in the Speed section of the Stagehand Properties Panel.

A screenshot of the same motor movement control interface. An orange oval highlights the 'Acceleration' field, which contains the value '12"/s²'.

RAMP TIME

Ramp Time indicates the number of seconds that the motor will take to accelerate up to programmed speed. If you would like to program the cue in time units, you can edit this field rather than using Acceleration. Spikemark will automatically calculate a new Acceleration based on the Ramp Time you enter.

A screenshot of the same motor movement control interface. An orange oval highlights the 'Ramp Time' field, which contains the value '2 s'.

TOTAL TIME

Total Time indicates the total number of seconds that the movement will take to complete. If you know that the motor needs to move the scenery in 10 seconds, you can enter a value of "10" here and Spikemark will recalculate the Speed and Acceleration values to make that happen.

NOTE:

Spikemark computes the Total Time and Ramp Time in the first cue of the show by comparing the programmed position to the motor's current position. In all subsequent cues in the show, Spikemark compares the programmed position to the previous cue's programmed position.

ADJUSTING TARGET POSITION

To change the programmed position of a motor in a cue, you can do either of the following:

1. Type a new position value directly into the Position field.

After you enter a new Position, Spikemark will recalculate the Total Time of the movement based on the new target position. If you had previously specified a spike for the movement, it will be removed and replaced with the explicit value entered.

-- OR --

2. Press the Spike button next to the Position field. Then select a spike or update your spike from the list and then click OK to accept.

Name	Value
Onstage	218"
Offstage	0"
Quarter	140"

SPIKES

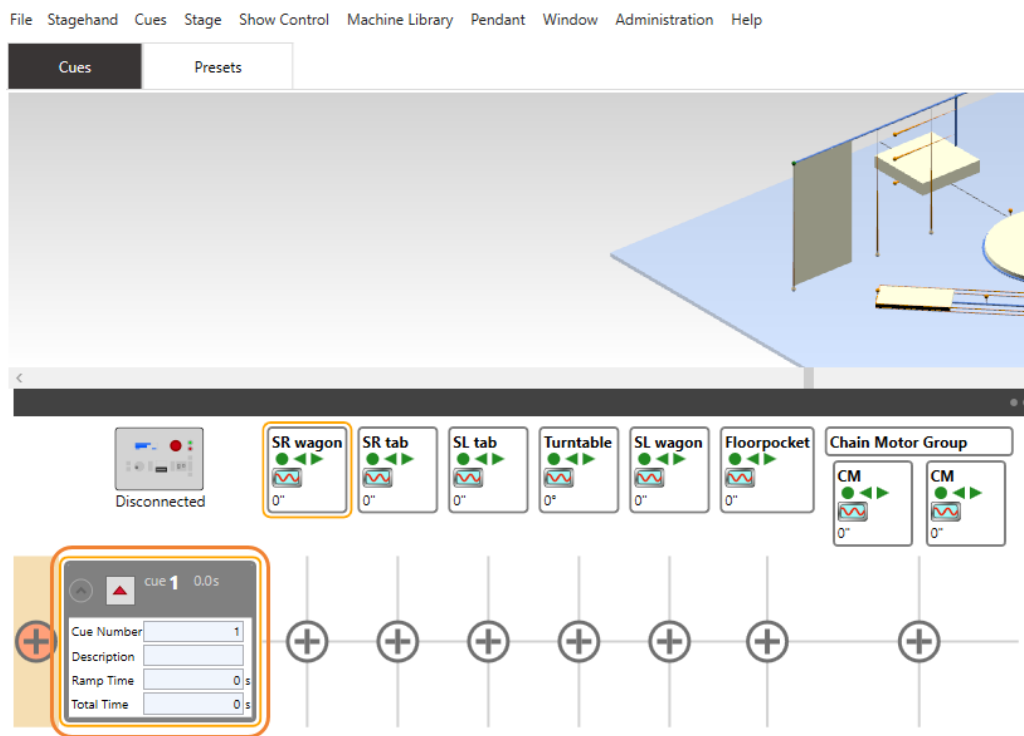
So far we've been typing in position values for every movement. That is a valid technique, but using Spikes to define positions offers some valuable benefits.

Traditionally, when you need to push scenery out on stage during a scene change you stick a piece of spike tape on the floor so you know when the scenery is at the proper position. You grab a marker and label the spike tape with a useful name like "Act II Parlor". Bits of tape on the floor end up being a much more practical way of placing scenery at the correct spot on stage rather than keeping a pocket notebook of measurements and running out with a tape measure during every scene shift to place the set. Besides avoiding the obvious embarrassment of standing on stage with a tape measure scratching your head, it also makes changing the position simpler. If you have to change a position during tech rehearsal, you lift the tape and move it instead of searching through a notebook and finding all the places in the show where you need to adjust the measurement.

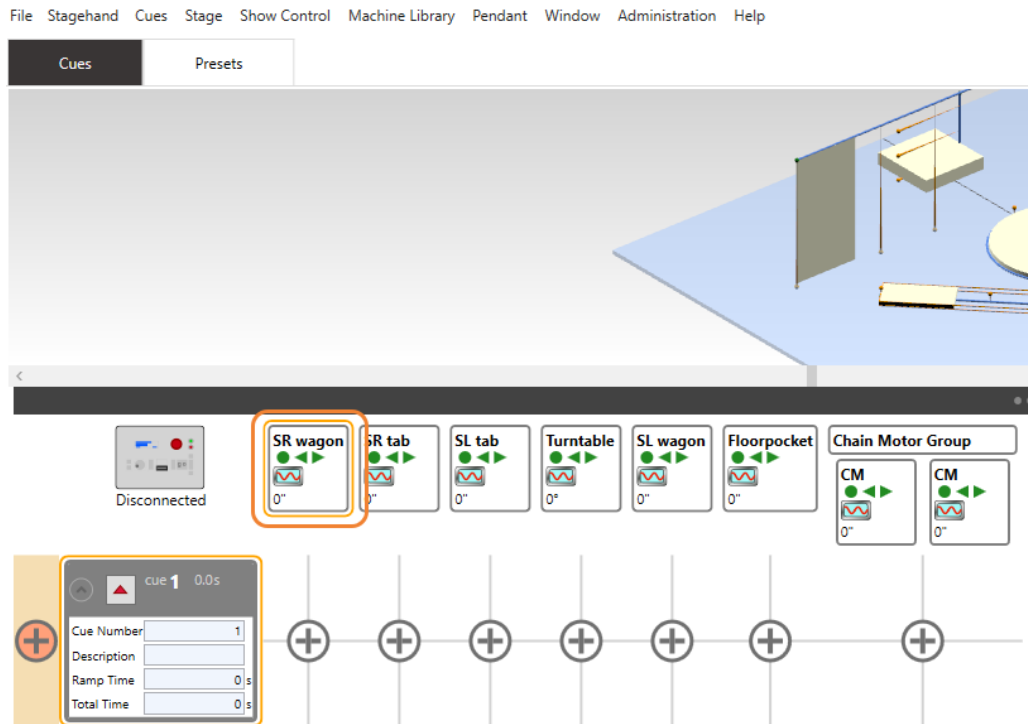
Spikes behave like virtual spike tape inside Spikemark. You can set positions and label them. You can program scenery to move to those positions in every cue that shares the spike. If you find that you need to change the spike position during rehearsal, just edit the value in one place and all of the cues are automatically updated with the new position.

ADDING SPIKES USING THE SPIKES POSITION BUTTON

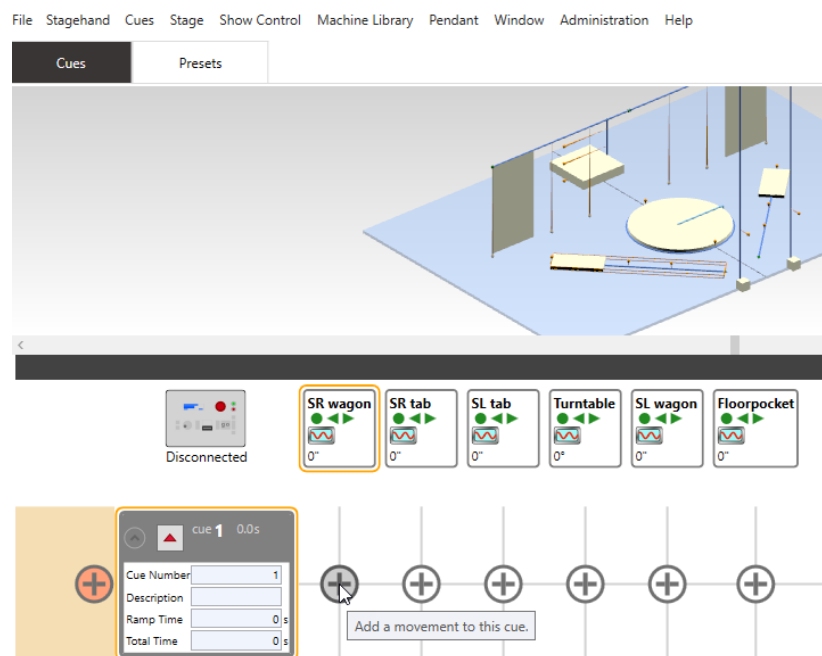
1. Click on the applicable Cue in the **Cue Grid** that contains the motors you wish to set the spikes for.



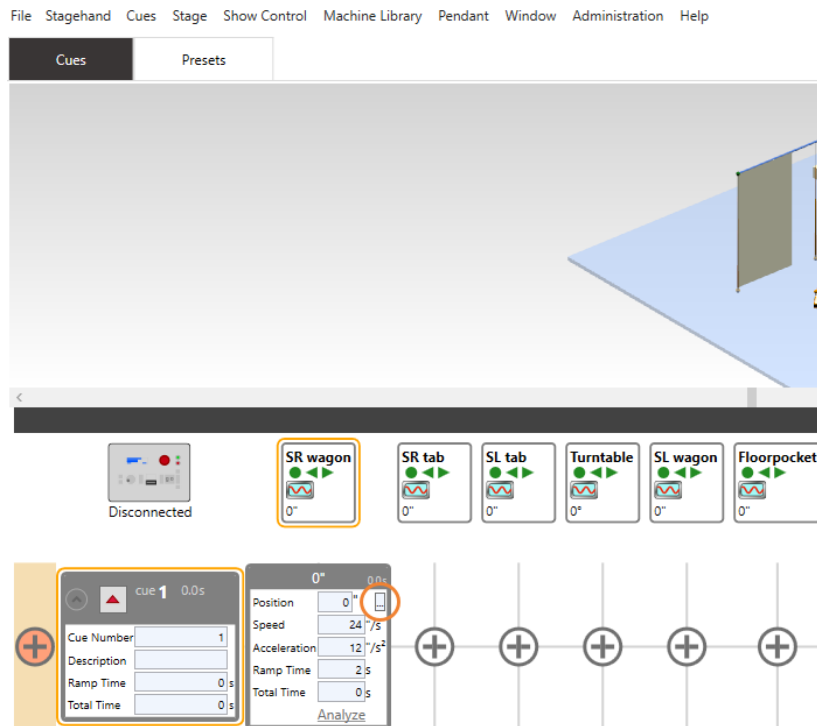
2. Select the motor to which you wish to add a spike.



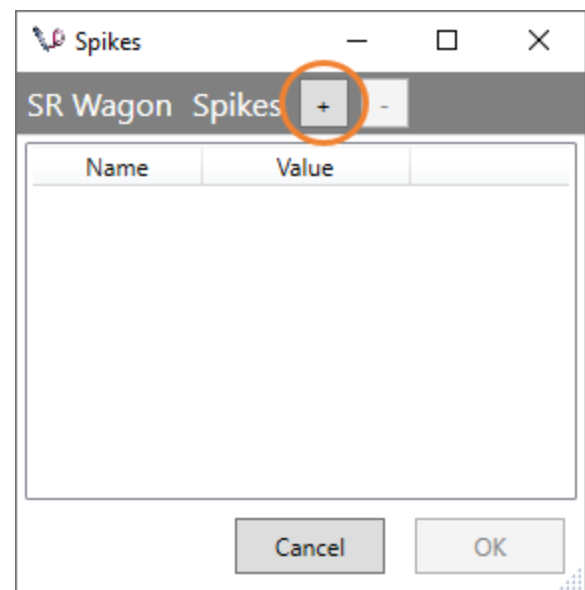
3. If you don't already have a movement for the selected motor in this cue, click the Add Movement button in the **Cue Grid**.



4. Click on the Spike Position button in the motor's movement window.

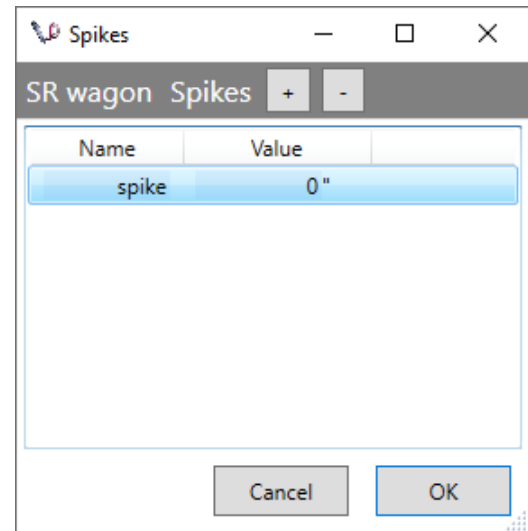


5. Click on the Add Spike button in the Spikes window.

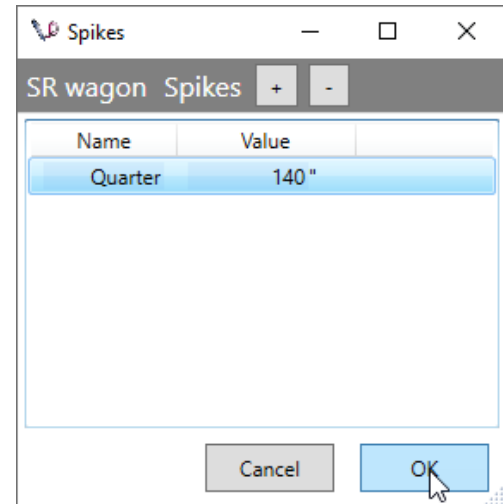


6. A new spike will be added with the generic Name of “spike” and a Value of “0”.

NOTE: The value automatically populates with the current position of that motor.

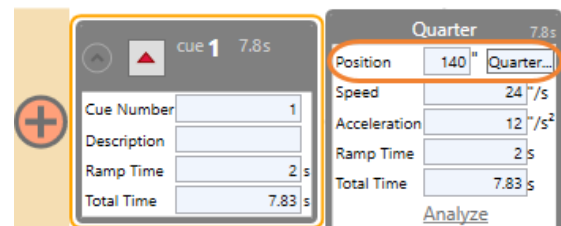
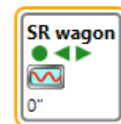


7. Enter a meaningful Name and the spike position Value. Select the spike by clicking to the right of the Value input field, and click OK.



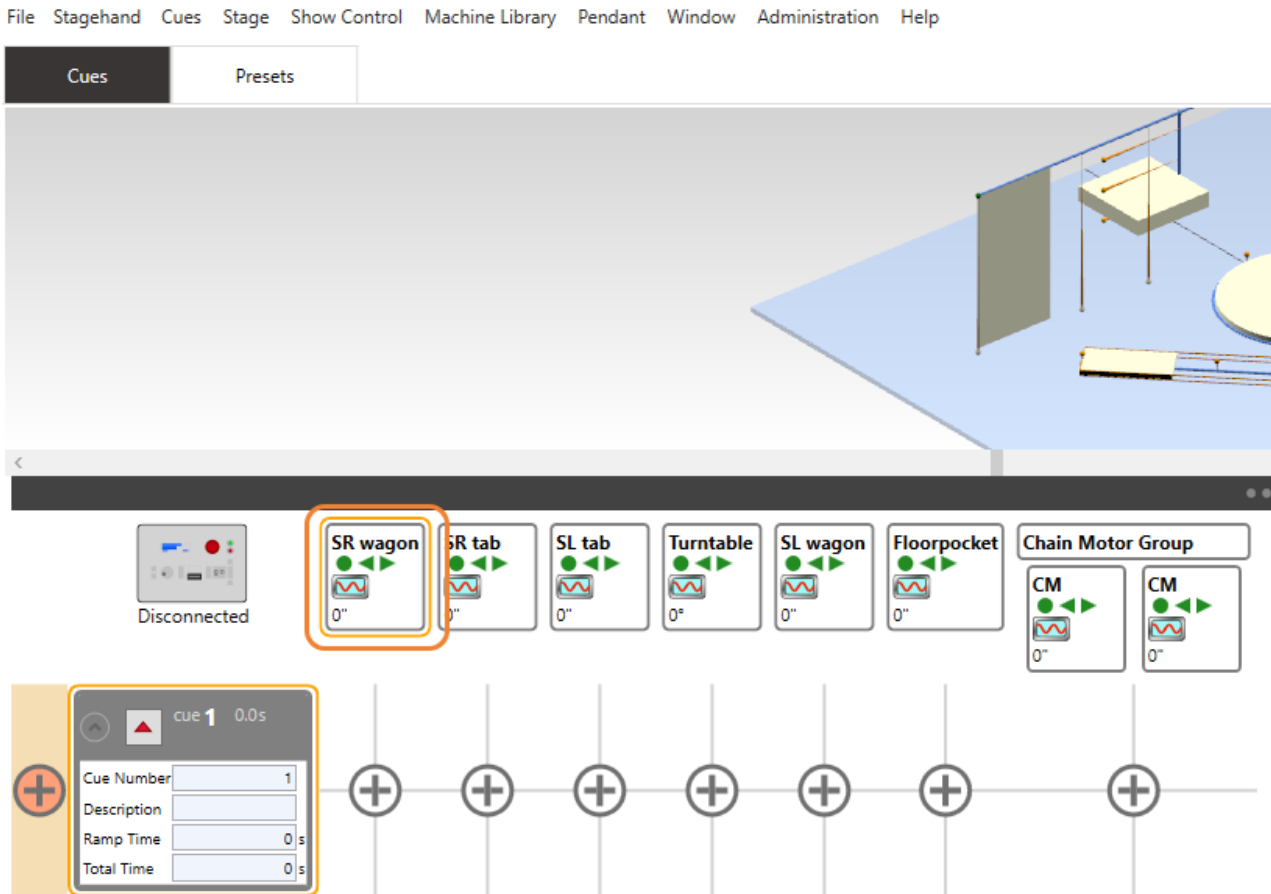
The selected spike will display in the motor's movement for the cue.

In the example, the SR Wagon will move to the defined Spike—“Quarter 140”—in Cue 1.



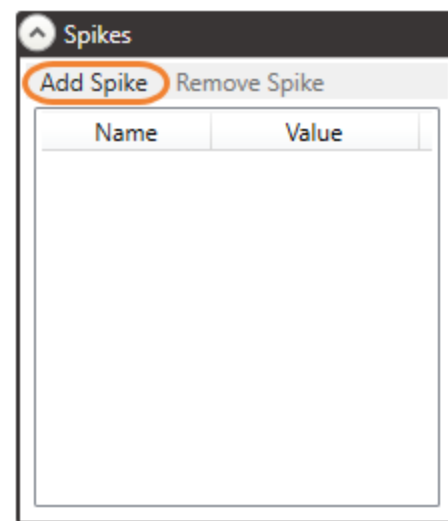
ADDING SPIKES USING THE STAGEHAND PROPERTIES PANEL

1. In the **Cue Grid**, select the motor to which you wish to add Spikes.



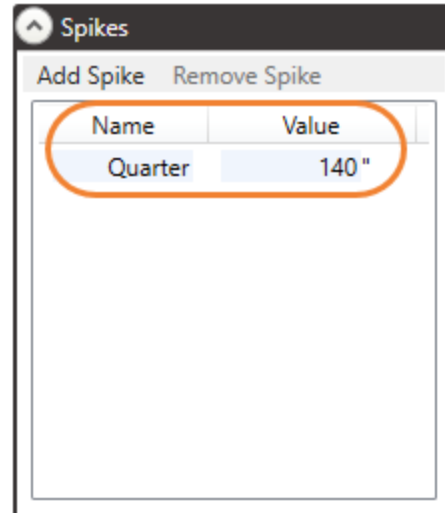
2. Scroll to the **Spikes** section in the **Stagehand Properties Panel** and click Add Spike.

PRO TIP: Verify that the correct motor is selected by checking the motor name at the top of the Stagehand Properties Panel. Accidentally changing/creating Spikes for the wrong motor is not fun!



3. Enter a logical Name and Value (the measurement where the Spike should be located).

The Name of the Spike is "Quarter" and the Value, or where the Spike will be placed, is position "140."

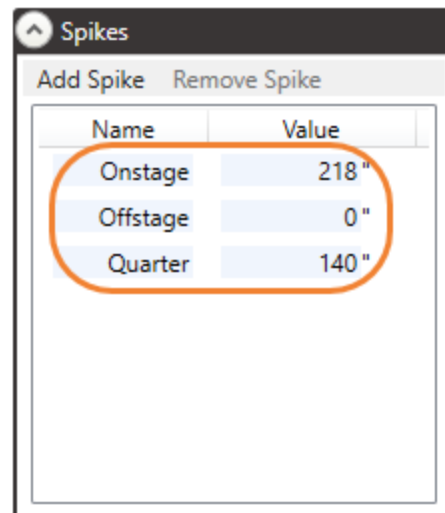


The screenshot shows a dialog box titled "Spikes" with a header bar containing an upward arrow icon and the title. Below the header are two buttons: "Add Spike" and "Remove Spike". A table is displayed below the buttons, containing one row with the following data:

Name	Value
Quarter	140 "

4. You can repeat steps 2 and 3 until you have all the Spikes for this motor.

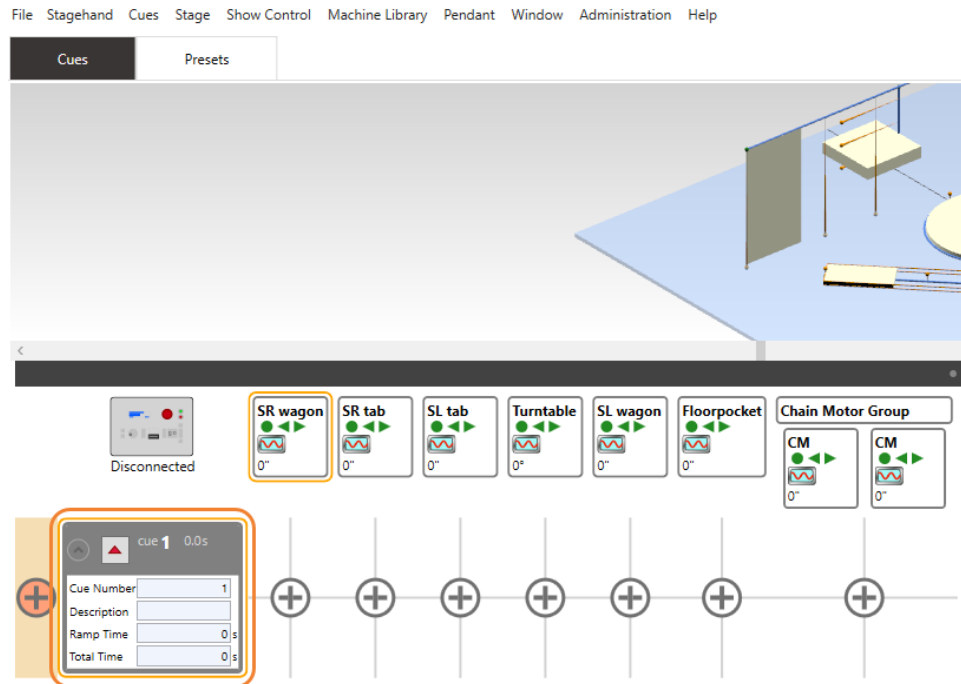
The Spikes "Onstage" and "Offstage" have also been added.



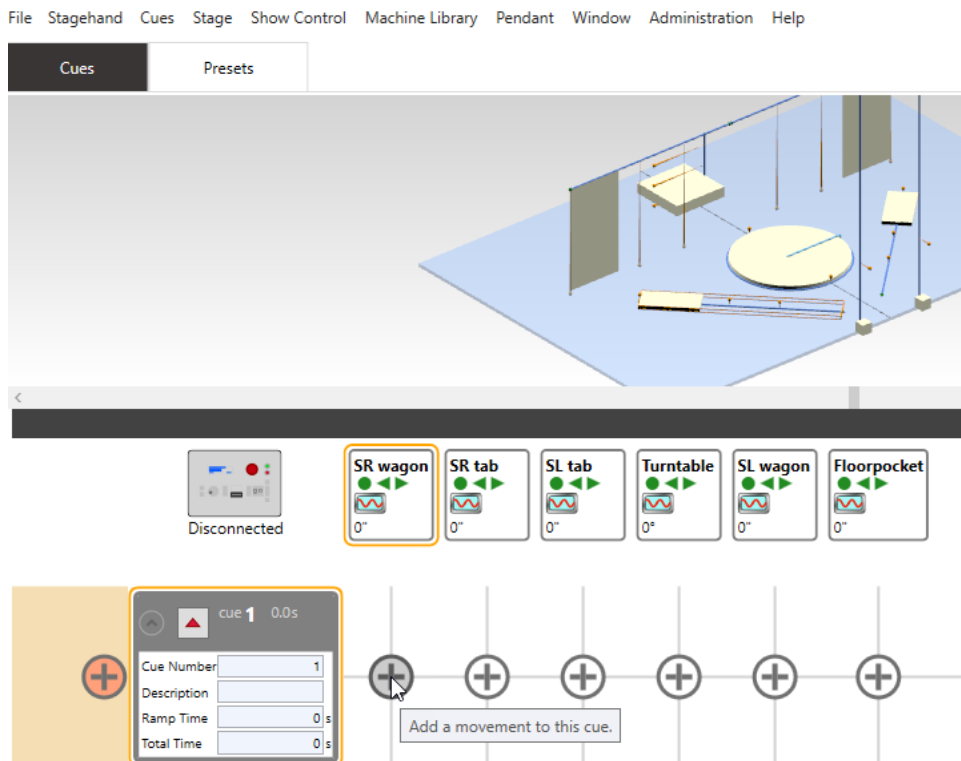
The screenshot shows the same "Spikes" dialog box, but now the table contains three rows of data:

Name	Value
Onstage	218 "
Offstage	0 "
Quarter	140 "

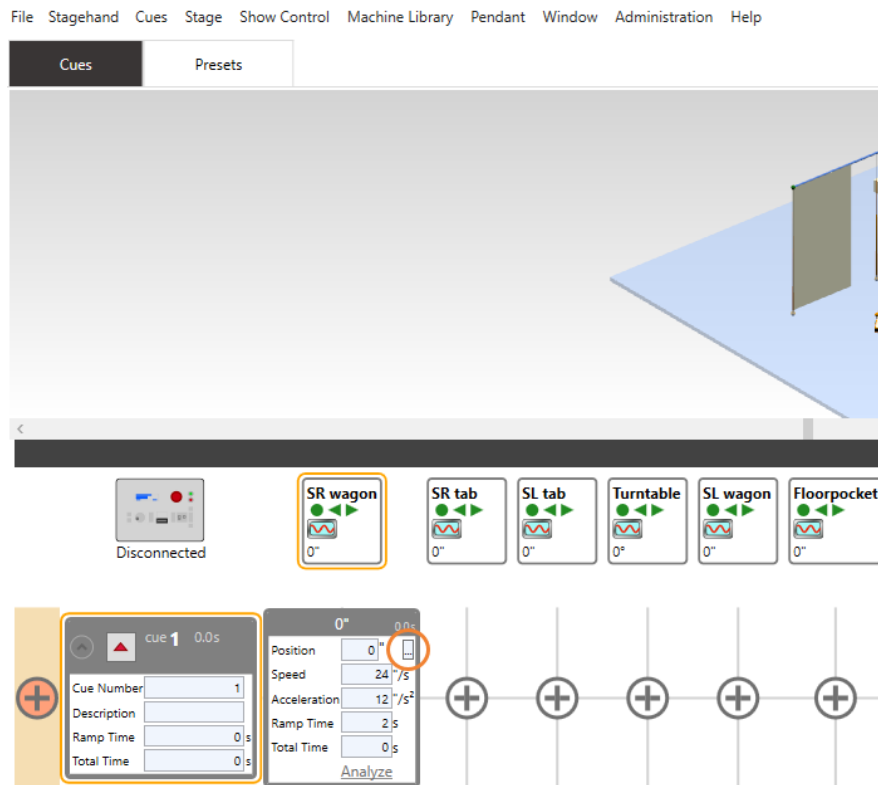
5. You can now set the position for the motors within any given cue by clicking on the applicable Cue in the **Cue Grid**.



6. If you don't already have a movement for the selected motor in this cue, click the Add Movement button in the **Cue Grid**.

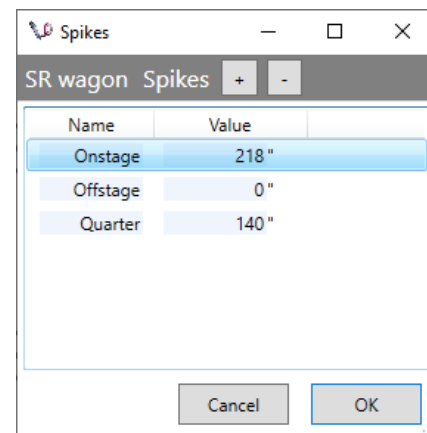


7. Click on the Spike Position button “...” in the motor’s movement window.



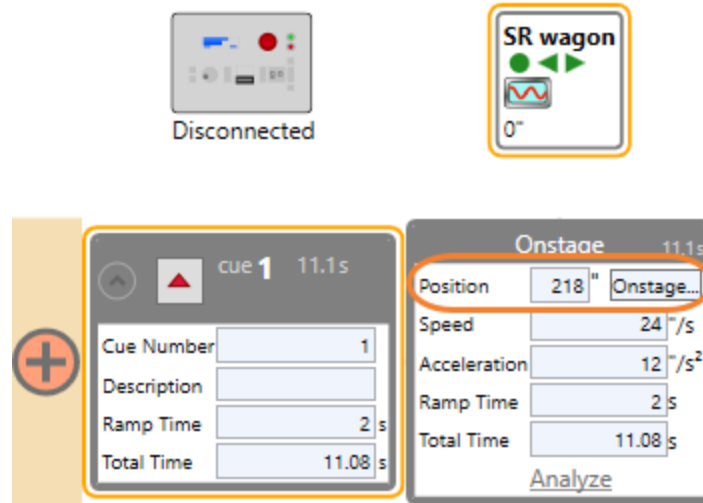
8. Select the Spike where you want this motor to move in this cue and click OK.

The Spike “Onstage 218” has been selected as determined by the blue highlight.



9. The selected Spike will display in the motor’s movement for the cue.

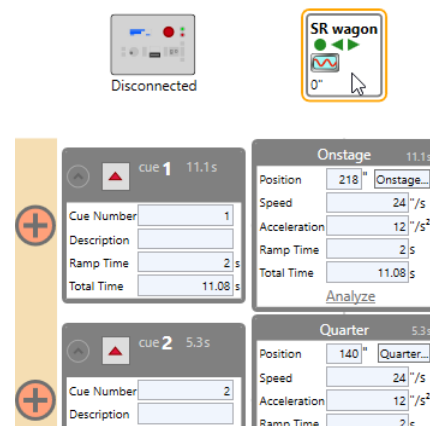
In the example below, the SR Wagon will move to the defined Spike-Onstage, 218-in Cue 1.



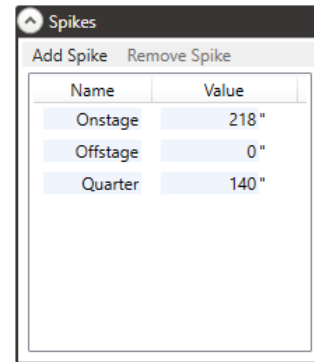
CHANGING A SPIKE POSITION

A key advantage to using Spikes is that you can edit the spike value and all cues that reference the spike will be updated. This makes it very easy to change position values and avoid tracking the changes manually through the entire show. For example, we've defined a spike named "Offstage." However, during the rehearsal process it becomes evident that the "Offstage" position needs to move onstage several inches to give more space for actors to pass in the wings. We've already used this spike in a bunch of cues, so to update the spike and have the new position updated in all cues we just edit the spike.

1. In the **Cue Grid**, select the motor that has the Spike you wish to edit.

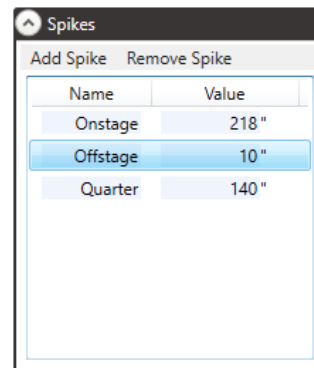


- Go to the **Spikes** section of the **Stagehand Properties Panel**.



- Edit the Value for the applicable spike, and press the Tab key.

In the example below, the "Offstage" Spike Value has been changed to "10".



- The position values will update in the cues that reference the Spike you edited.



Cue	Onstage	Quarter	Offstage
cue 1	218 "	140 "	10 "
cue 2	218 "	140 "	10 "
cue 3	218 "	140 "	10 "

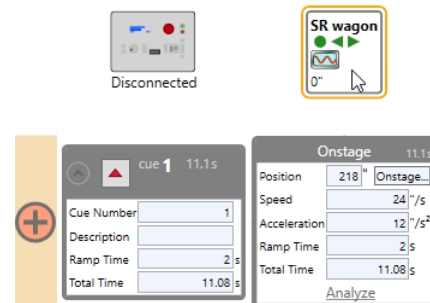
ADJUSTING SPEED IN A MOVEMENT

Now that we have discussed how to control the Position of Movement, let us look at adjusting the Speed of a Movement. There are two ways to adjust how fast a motor moves:

1. Specify the speed of a motor directly.
2. Specify how long (the time) it should take for the motor to reach the target position and then let Spikemark automatically compute the speed for you.

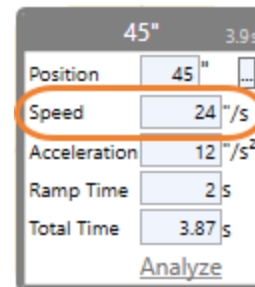
SPECIFYING THE SPEED OF A MOTOR DIRECTLY

1. Select the motor you wish to update at the top of the **Cue Grid** and select the Speed value for the applicable motor movement.



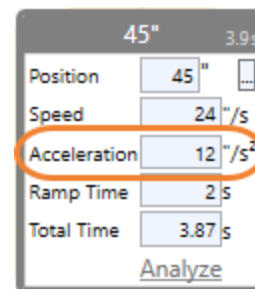
2. Enter a new Speed value and press the Tab key.

(Note: The Ramp Time and Total Time are recomputed automatically by Spikemark.)



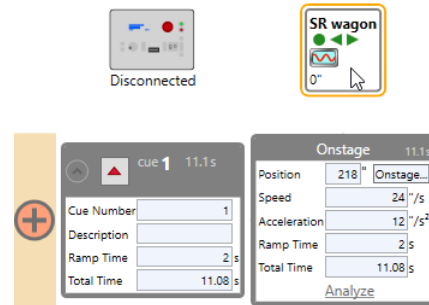
3. Enter a new Acceleration value and press the Tab key.

(Note: The Ramp Time and Total Time are recomputed automatically by Spikemark.)



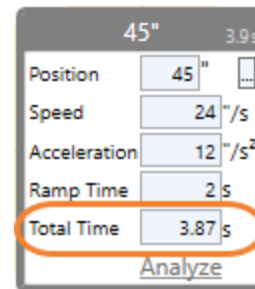
SPECIFYING HOW LONG THE MOTOR SHOULD TAKE TO REACH THE TARGET POSITION

1. Select the motor you wish to update in the **Cue Grid** and select the Total Time value for the applicable motor movement.



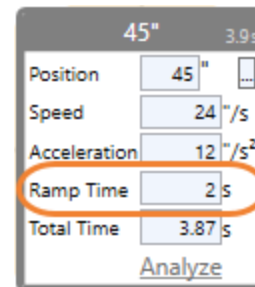
2. Enter a new Total Time value and press the Tab key.

(Note: The Speed and Acceleration are recomputed automatically by Spikemark.)



3. Select and change the Ramp Time value and press the Tab key.

(Note: The Speed and Acceleration are recomputed automatically by Spikemark.)

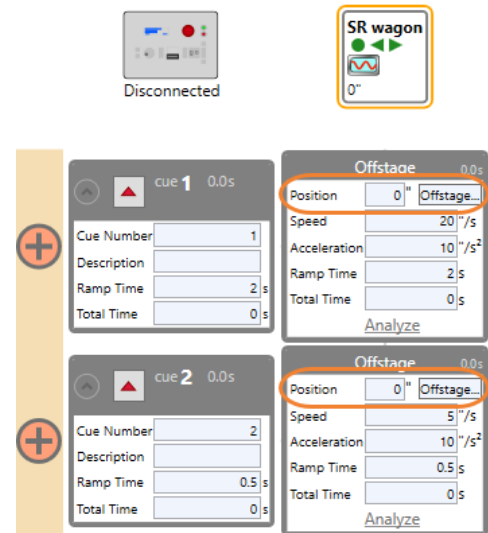


NOTE: If you enter a Total Time or Ramp Time combination that would require the motor to exceed its Max Speed [specified in the Speed section of the Stagehand Properties Panel], then the Total Time and Ramp Time will be recomputed to be *no higher than* the Max Speed.

CHANGING THE SPEED OF A MOTOR (PILE ON CUES)

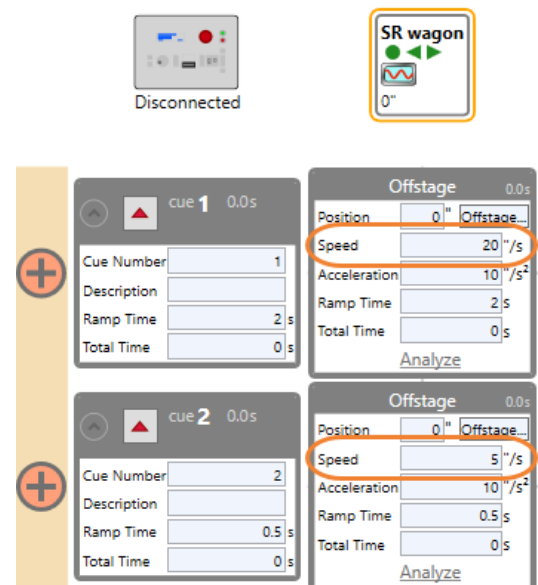
1. Write two cues for the same motor, with the same target Position.

In the example, the target Position in each cue is "0."



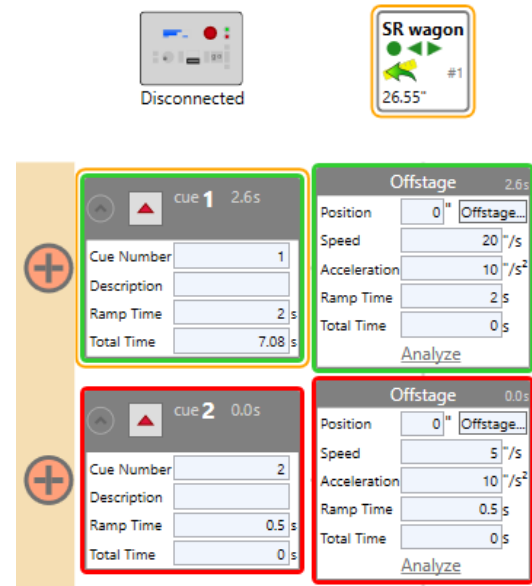
2. In each Cue, enter the two different Speed values.

In the example, the Speed in Cue 1 is "20" and the Speed in Cue 2 is "5." The Acceleration is controlled by the first cue, and cannot be altered mid-move.



- While Cue 1 is running, load Cue 2 and run it whenever you want the motor to decelerate to the new speed

Remember, the second cue will use the acceleration from the first cue (or any parent cue), regardless of the acceleration value of cue 2.

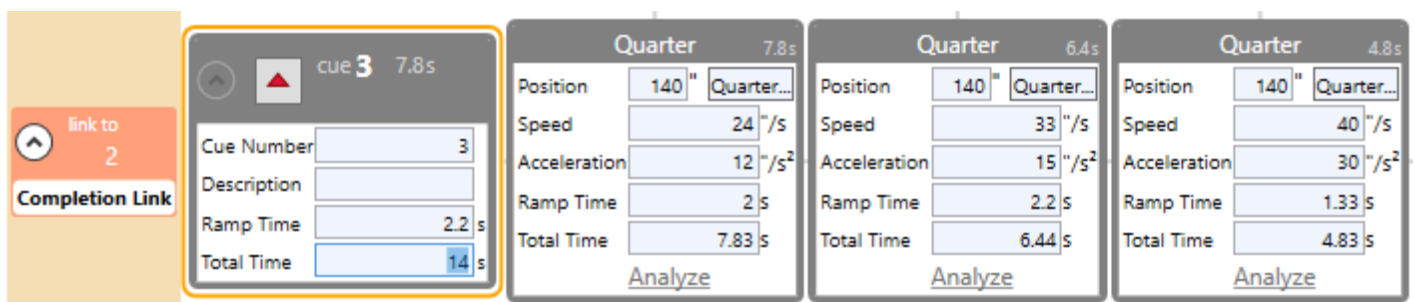


Changing the speed of a motor mid-move can also be programmed to happen automatically with [Cue Links on page ____](#).

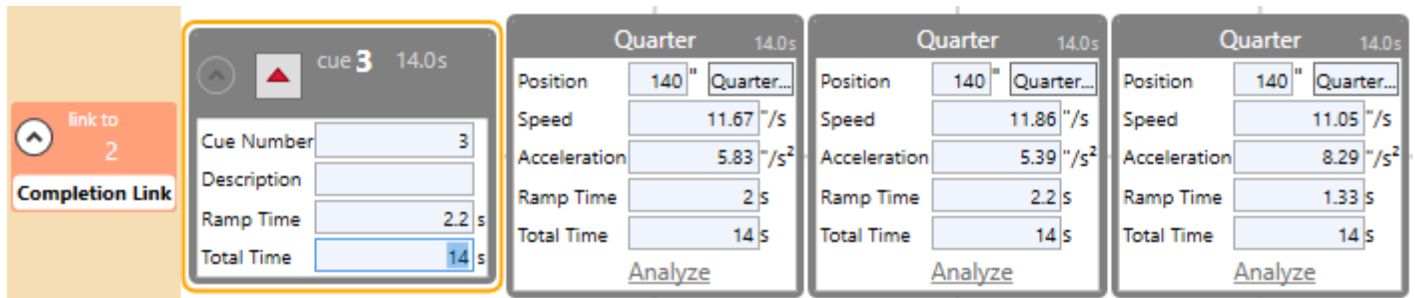
CHANGING CUE TIME

You can change the time for all the movements in a cue by specifying the Total Time and Ramp Time for the entire cue, not just each movement. This makes it easy to write cues that have all the motors ending at the same time.

- Select the Cue you wish to edit in the **Cue Grid**.



- Type in the new Total Time value you wish to use and press the Tab key.
(Note: The Total Time values for each movement have been updated.)



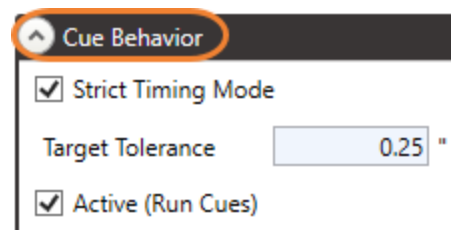
3. Repeat the steps for Ramp Time to control the acceleration and deceleration time of all the Movement in each cue.

CUE BEHAVIOR

In Spikemark, there are two modes with which you can set a motor to run within a cue: Target Tolerance and Strict Timing Mode. In Target Tolerance Mode the motor is set to move within a certain distance of its target position. Once the motor finds its target (within the specified tolerance) the motor will shut down and the cue will complete. In Strict Timing Mode the motor will ignore its target position and stop after the determined cue time has been reached.

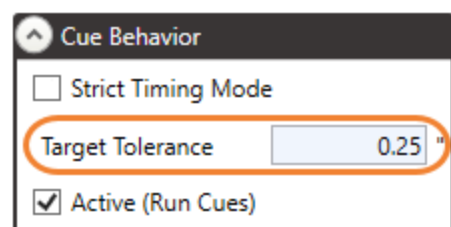
The Active value will allow you to deactivate a Stagehand if there is a reason you do not want it to move in a cue or jog. To have the Stagehand active, check the Active box. To deactivate the Stagehand, uncheck the Active box.

1. To specify which cue completion mode to use, select the motor you wish to edit in the **Cue Grid**.
2. Scroll to the **Cue Behavior** section in the **Stagehand Properties Panel**.



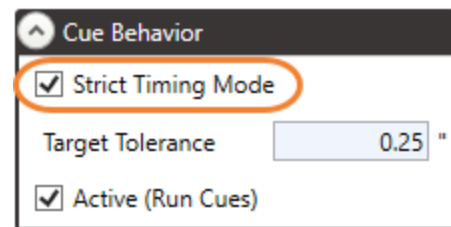
3. To use Target Tolerance mode, make sure that Strict Timing Mode is deselected and enter a Target Tolerance value, which is listed in scaled position units (*for example, inches, degrees, etc.*).

(Note: "0.25" equals 1/4 inch.)



- To use Strict Timing Mode, select the Strict Timing Mode field.

(Note: With Strict Timing Mode checked, the Target Tolerance value will be ignored.)



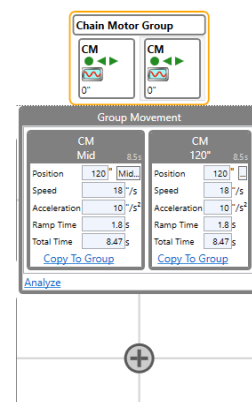
NOTE:

For shows that have tight timing requirements, this option may be useful. However, it has mostly been included in Spikemark since it was the only mode available in earlier versions of Spikemark. When using this mode, you have to be diligent about tuning your motors well. Sloppy tuning will result in motors abruptly stopping in mid-move.

CREATING GROUP MOTION

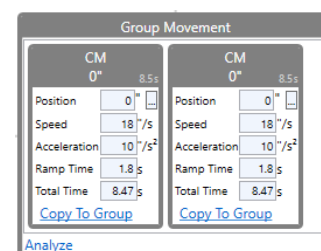
Creating cues with a Motion Group is quite similar to creating cues for a regular motor, but with multiple motors acting as one, means that we need to set the same Movement values for each motor within the group.

- To create a Movement for a group, press the "+" button that is displayed at the intersection of the cue row and the grouped motor column.



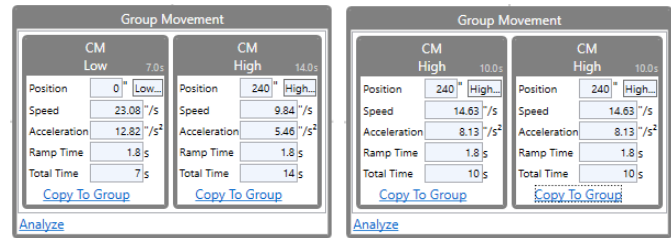
- A new Group Movement box will appear.

Notice how you essentially have two regular motor movement boxes inside of a larger Group Movement bounding box.



3. Set all the values for each motor within the group the same way you would for a single motor.

Individual motors within group movements can have different speeds and targets. If this is the case for your cue, edit each movement individually and you're ready to go.



If you are sending all the motors in a group movement to the same target at the same rate, you can set the values on one motor and use the “Copy to Group” button.

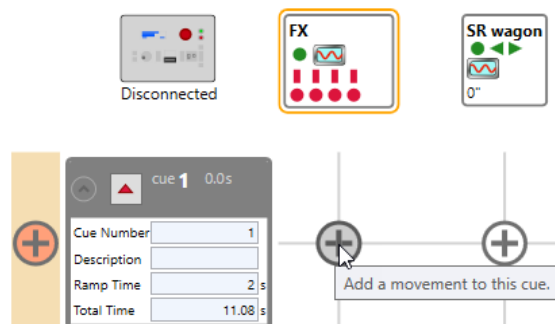
Keep in mind that using the same values for all motors within a group should result in synchronous movement while differing values will create variable movement.

Neither is wrong, just know what the loading effects will be on your scenery.

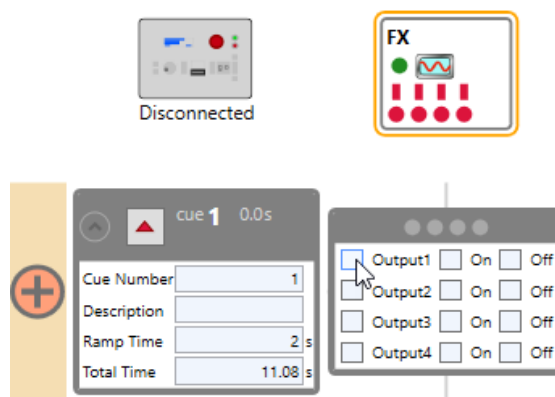
ADDING AN FX MOVEMENT TO A CUE

Adding an FX movement to a cue is similar to adding a motor movement.

1. Click the “+” button in the **Cue Grid** correctly associated with the Stagehand FX and Cue you wish to edit.



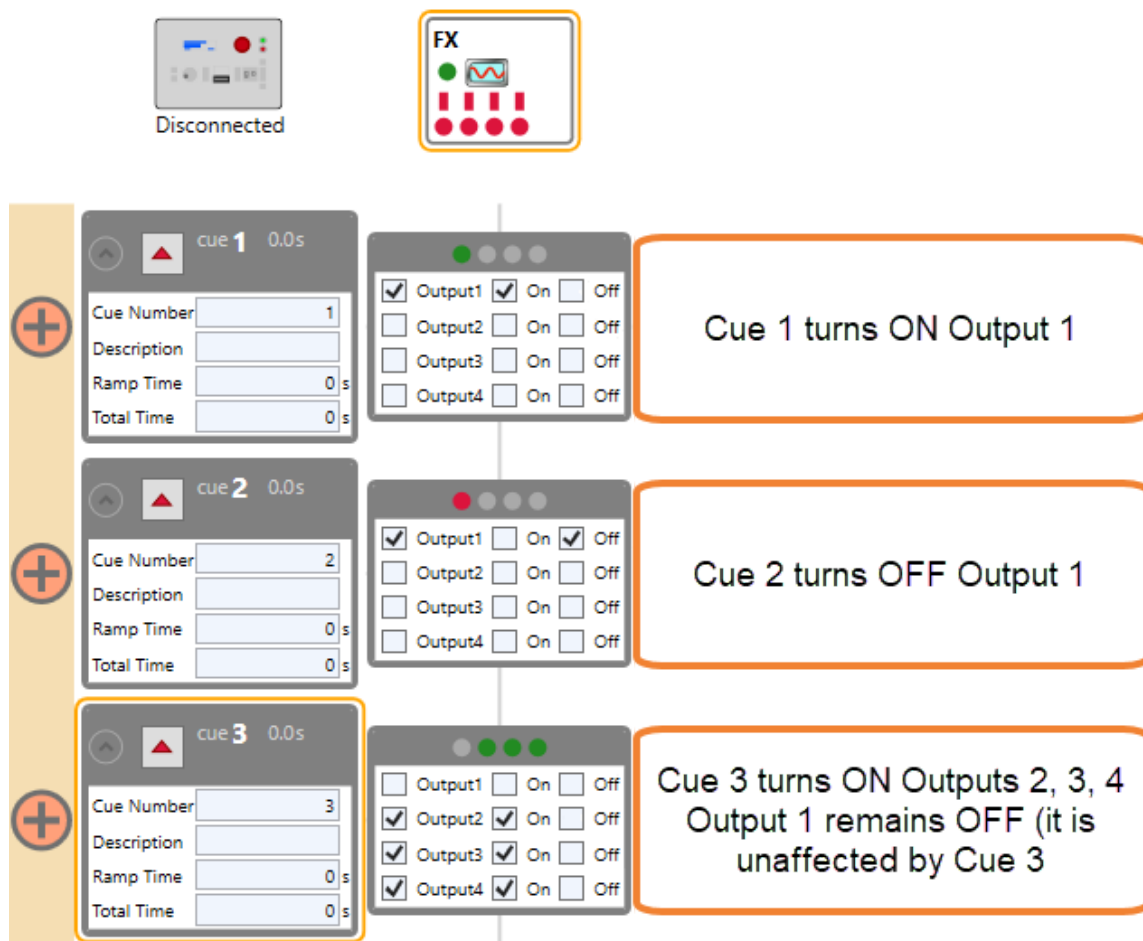
2. An FX movement will appear in the Cue Grid.



NOTE:

An FX movement can turn any output switch on or off in the cue. If a switch is turned on in one cue, it will remain on until another cue turns it off. Therefore, if you don't want to change the state of a switch in a cue, leave the switch unchecked completely.

Below is an example series of cues that turns Output 1 on, then off, then turns Outputs 2, 3 and 4 on, while leaving Output 1 off.



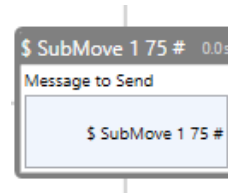
ADDING A MESSENGER MOVEMENT

Adding a virtual Stagehand to the show follows the same general guidelines as adding a physical Stagehand. Once the virtual motor is added to the show, adding a movement only requires clicking the “+” for the corresponding cue.

OSC Messenger Movement



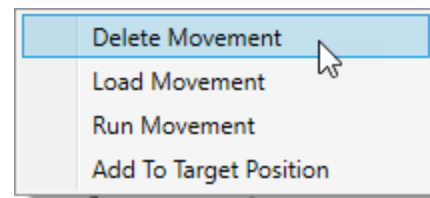
UDP Messenger Movement



REMOVING A MOVEMENT FROM A CUE

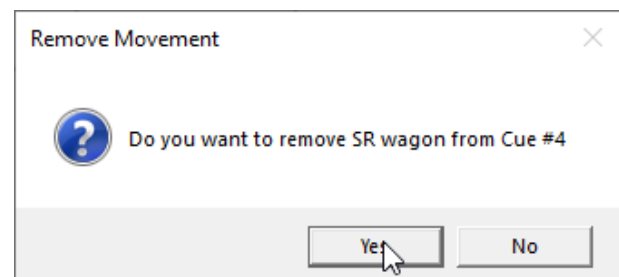
Sometimes you will write a cue with a number of motors moving and then discover one of the motor movements should not be in the cue.

1. Right-click on the motor's movement you wish to delete in the **Cue Grid** and select Delete Movement.



2. Click Yes in the Remove Movement confirmation dialog box.

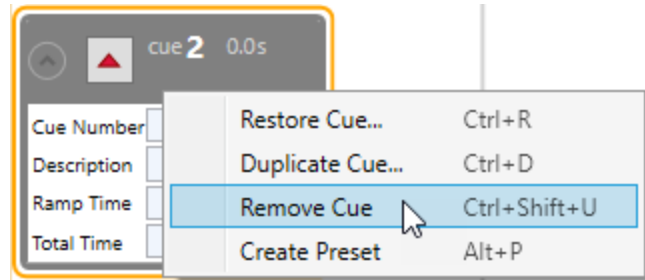
(Note: If you delete a Movement, the Movement is gone forever. There is no Undo when you delete a Movement.)



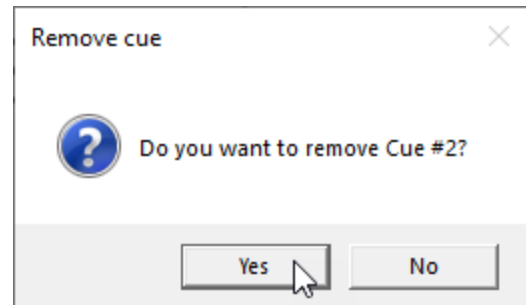
DELETING A CUE

Theatre is a dynamic process. Throughout rehearsals scene shifts will be added, and deleted as the performance is shaped. To keep up with the rapid changes, Spikemark makes it just as easy to remove cues as it is to add them. There are two simple ways to delete a cue from a show:

1. Right-click on the cue you wish to delete in the **Cue Grid** and select Remove Cue.



2. Click Yes in the Remove Cue confirmation dialog box.

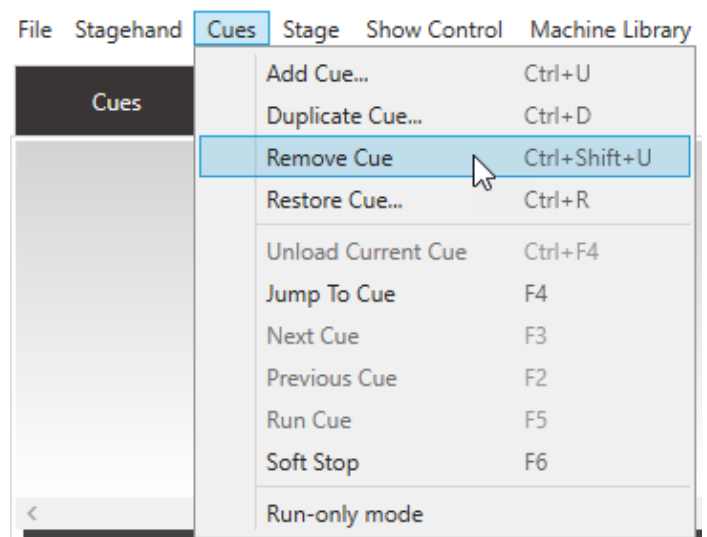


-- OR --

Select the cue you wish to delete in the Cue Grid. In the **Cues** menu, click Remove Cue and then click Yes to confirm the deletion.

Note: If you remove a Cue, the Cue you removed is gone forever. There is no Undo when you remove a Cue.

PRO TIP: Try adding 1000 or 2000 to the cue number (ie. Cue 17 → 1017) to remove the cue from your show sequence, but leaving it in your showfile for future reference (or when the director re-changes their mind).



CUE LINKS

ADDING CUE LINKS

As you are writing cues in a new show, you'll find scene changes in which simple cues fall short of your desired effect. You might want to fire a sequence of movements, all within one cue, but each with a different start time. For example, you might want a two-second delay between the start of each movement. Or, maybe the house wagon needs to wait to move upstage until the balcony unit is clear and in the wings. Whatever the need, links allow you to create sequences of cues that start automatically in a staggered fashion.

Links are great for cue sequences that can be reliably run in the exact same way every performance. If you find that a link is too rigid (*for example, you need to run two cues, timed such that the second cue runs right after an actor says a specific line*), a cue link might be too rigid, because the timing of the actor's line is unpredictable from night to night. In these instances, you should keep the cues independent or use Pile On Cues. Pile On Cues are just cues that are loaded manually, and at your own discretion, before the previous cue completes. Since Pile On cues are just cues, we do not label it differently in Spikemark.

When discussing Cue Links, we need a vocabulary to refer to the two cues that are linked together:

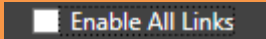
Parent Cues are the cues being watched by the link. The Parent Cue is run by either pressing the GO button, or it may be a Child Cue (see below) of another link in a longer sequence of linked cues. Whenever the Parent Cue is running, the link will check its criteria and automatically start the Child Cue when the criterias are met.

Child Cues are the cues that are started by the link. When the link's criterias are satisfied, the link will automatically run the Child Cue. Graphically, in the **Cue Grid**, Child Cues have the link displayed next to cue.

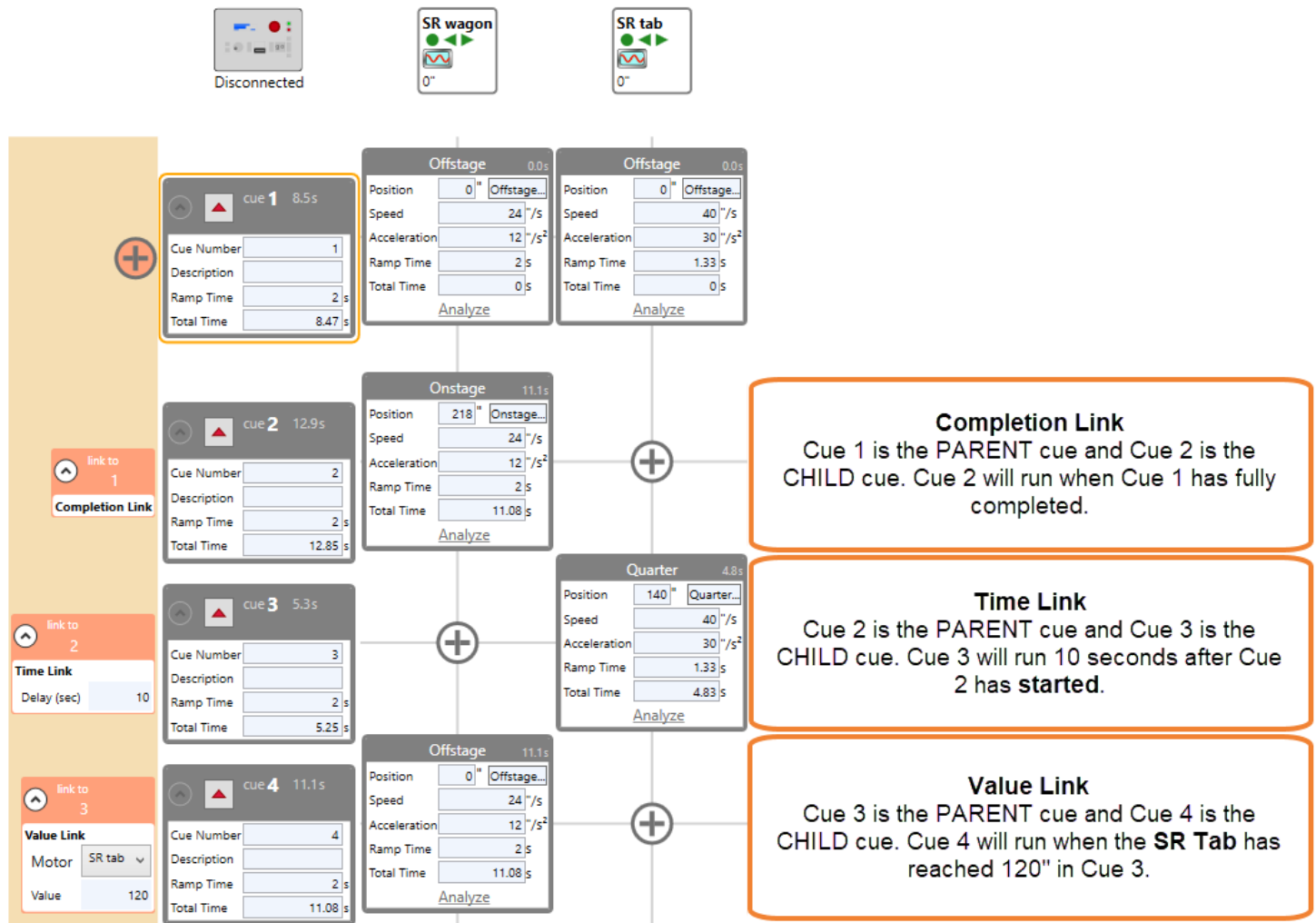
All links are displayed in the left margin of the Cue Grid.

NOTE:

The checkbox in the status bar at the bottom of the Spikemark main screen—"Enable All Links"—can be used to enable or disable all cue links. With the checkbox checked, any cue links will trigger as expected.



Child cues will not be triggered if a Soft Stop or E-Stop are triggered.



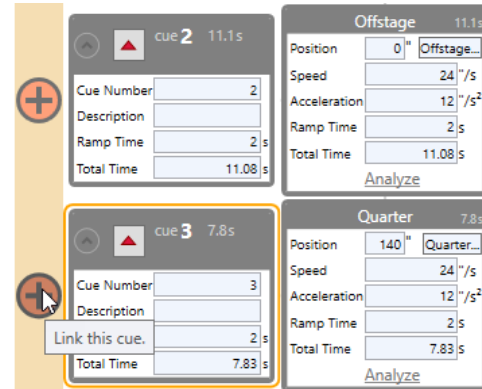
NOTE:

You can create an infinite loop by creating two links between two different cues. You would set up your links so that Cue 1 is the Parent Cue of Cue 2 and Cue 2 is the Parent Cue of Cue 1. This might be useful if you are testing machines or if you need a motor to cycle back and forth indefinitely. To stop such a loop of cues, you would click the Stop button in the Cue Controller, use the Emergency Stop on the Showstopper, or use a "Soft Stop Motor" Input Action with a Stagehand FX.

LINKING CUES BY COMPLETION

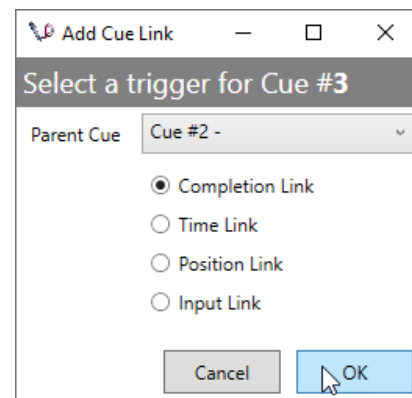
You can link two cues together by completion, so that when the **Parent Cue** completes successfully, the **Child Cue** will begin.

1. Click the Add Link button next to the Child Cue.



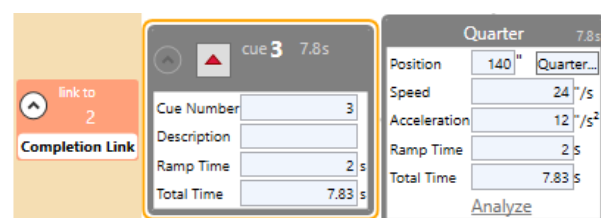
2. Select the Parent Cue from the drop down list and select Completion Link, then press OK.

In the example pictured, the selected Parent Cue is "Cue 2."



3. The new link will appear in the left margin of the **Cue Grid**.

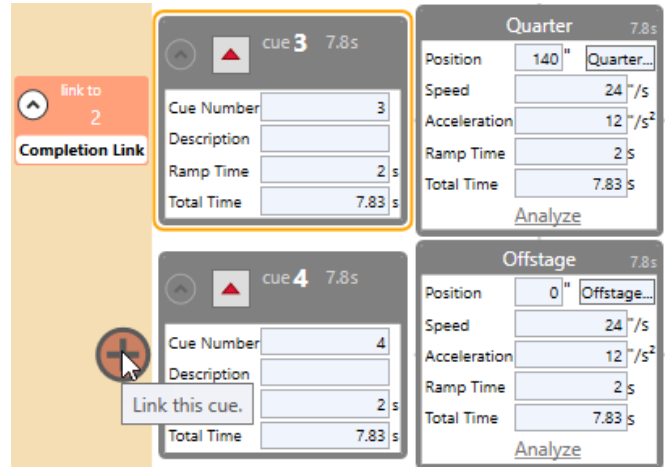
In the example, Cue 3 (Child Cue) will not run until Cue 2 (Parent Cue) has been completed.



LINKING CUES BY TIME

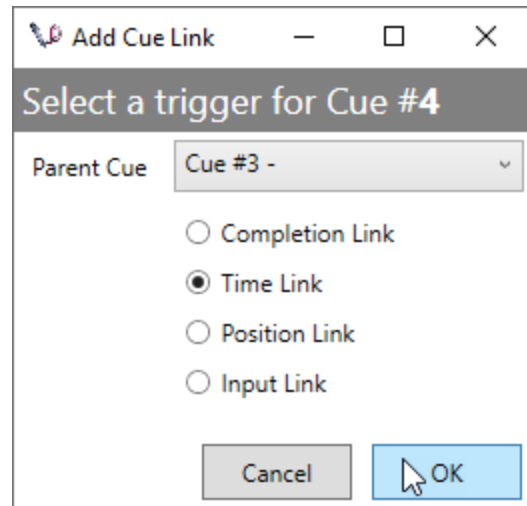
You can link two cues together with a time delay so that the **Child Cue** runs a programmed number of seconds after the **Parent Cue** starts.

1. Click the Add Link button next to the Child Cue.



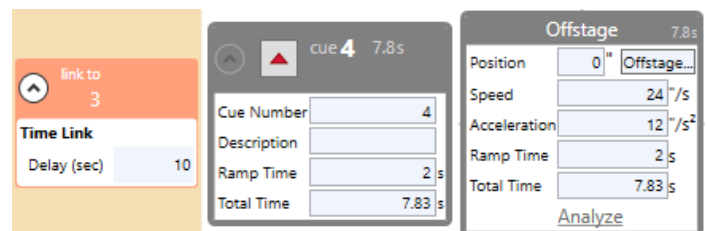
2. Select the Parent Cue from the drop down list and select Time Link, then press OK.

In the example pictured, the selected Parent Cue is "Cue 3."



3. The new link is displayed in the left margin. You can edit the Delay value to be any number of seconds, including decimal values.

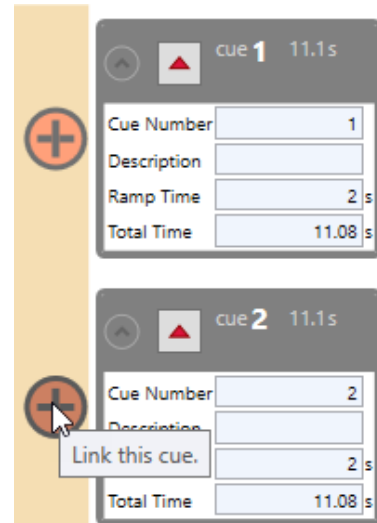
In the example, Cue 4 (Child Cue) will not start until Cue 3 (Parent Cue) has run for 10 seconds.



LINKING CUES BY MOTOR POSITION

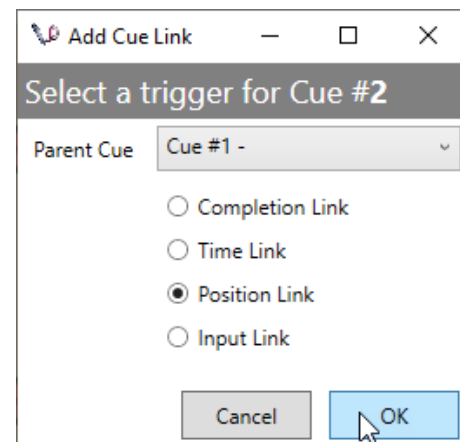
You can link a **Child Cue** so that it runs when one of the motors in the **Parent Cue** reaches a defined position. This is handy when you have to ensure that one motor has cleared the way for another motor.

1. Click the Add Link button next to the Child Cue.



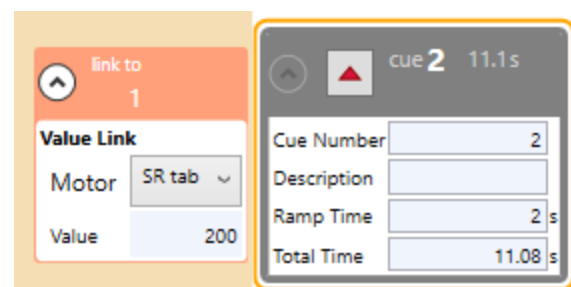
2. Select the Parent Cue from the drop-down list and select Position Link, then press OK.

In the example pictured, the selected Parent Cue is "Cue 1."



3. The new link will appear in the left margin next to the Child Cue. Select the Motor from the Parent Cue and enter a position that will trigger the link.

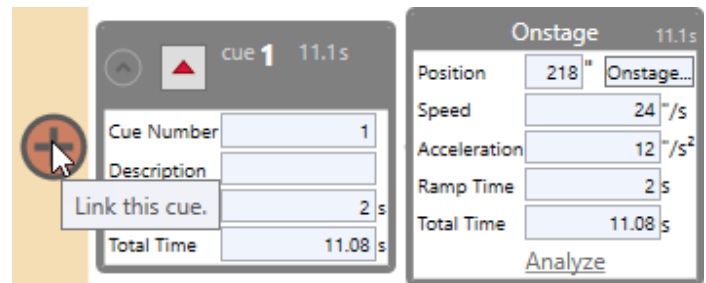
In the example, Cue 2 (Child Cue) will not start until the SR tab in Cue 1 (Parent Cue) reaches the 200" mark.



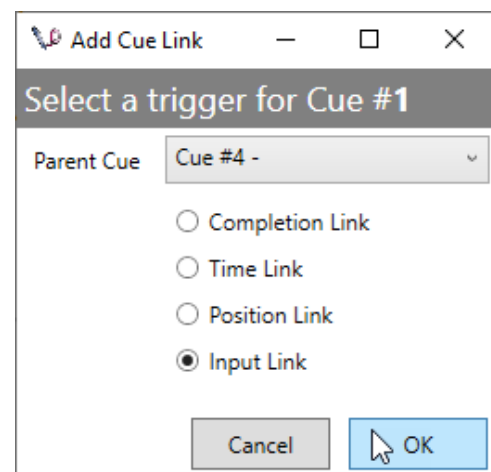
LINKING CUES BY FX INPUT

You can link a **Child Cue** to a **Parent Cue** so it runs as soon as an input switch is detected from a Stagehand FX. This can be handy if you have two cues that need to run in close proximity, but require a crew member to give a “Clear” signal for the second cue. In such a case, you could wire a pushbutton to the input of a Stagehand FX. When the Parent Cue runs, the crew member would push the button to start the Child Cue when appropriate.

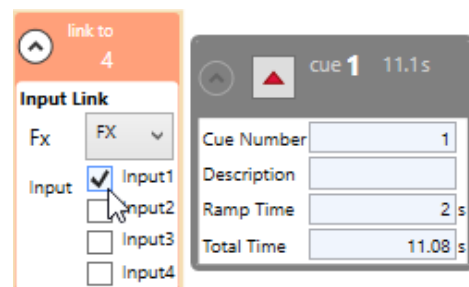
1. Click the Add Link button next to the Child Cue.



2. Select the Parent Cue from the drop-down list and select Input Link, then press OK.

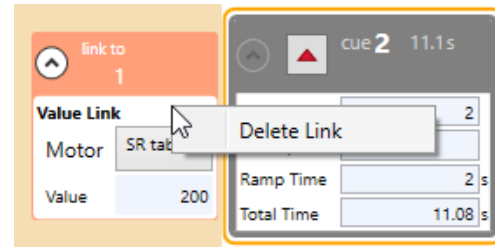


3. The new link will appear in the left margin of the Cue Grid. Select the Stagehand FX and the input that should trigger the Child Cue.

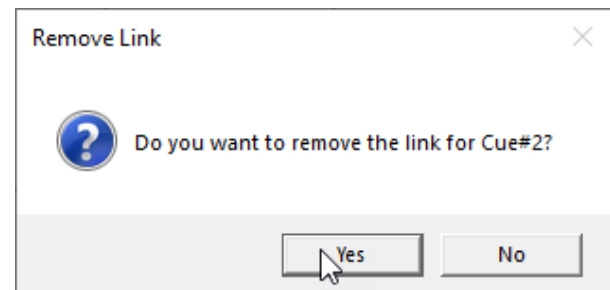


DELETING A CUE LINK

1. Right-click on the Link in the **Cue Grid** and select Delete Link.



2. Click Yes in the Remove Link confirmation dialog box.



CHANGING THE SPEED OF A MOTOR

There are some cues that require a motor to change *speed* in the middle of the movement. Perhaps a turntable needs to move at a walking pace for 30 seconds and then speed up to running pace and then back down. Other cues require the motor to oscillate smoothly between two positions without coming to a stop and setting the brake, such as a wave which rises and falls smoothly throughout a scene. We refer to these as Multi-Speed or Multi-Position Links

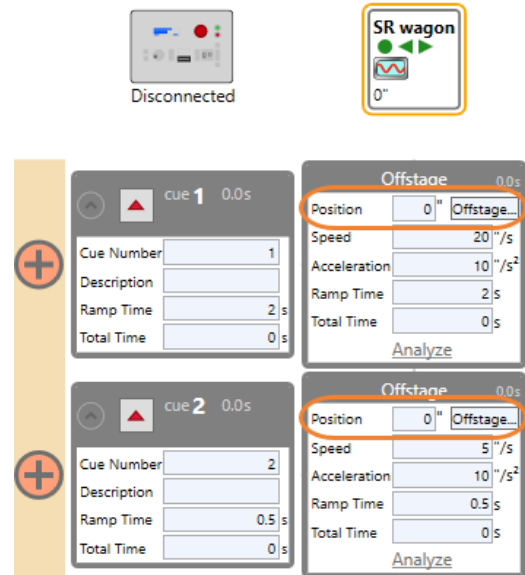
Spikemark can handle either of these scenarios with ease. The steps are illustrated in the sections below: “Changing the Speed of a Motor—Manually,” “Changing the Speed of a Motor—Automatically,” and “Ping-Pong” a Motor—Changing a Motor’s Position.”

It should be noted that it is feasible to change *both* the speed and the position of a motor, so that your wave might move between two positions, rising up and down and changing speed, moving slowly and then faster.

CHANGING THE SPEED OF A MOTOR—AUTOMATICALLY

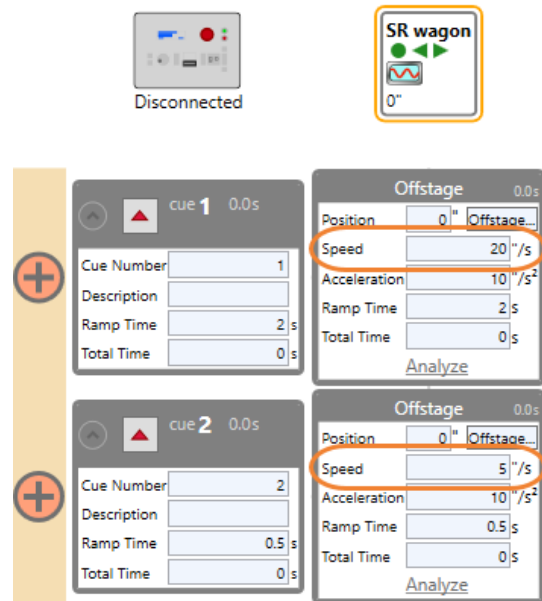
1. Write two cues for the same motor, with the same target Position.

In the example, the target Position in each cue is "0."



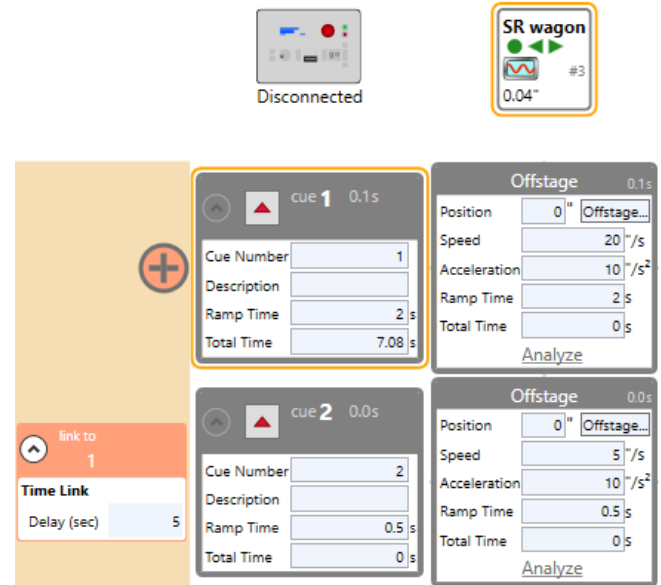
2. In each cue, enter the two different Speed values.

In the example, the Speed in Cue 1 is "20" and the Speed in Cue 2 is "5." The Acceleration is controlled by the first cue, and cannot be altered mid-move.



3. Link the two cues together using a Time Link or Position Link.

In the example, Cue 1 and Cue 2 are linked with a Time Link.



NOTE:

When linking two cues to automatically change a motor's speed, do not use a Completion Link as this will bring the motor to a complete stop. Use a Time Link or Position Link in order to smoothly change speeds.

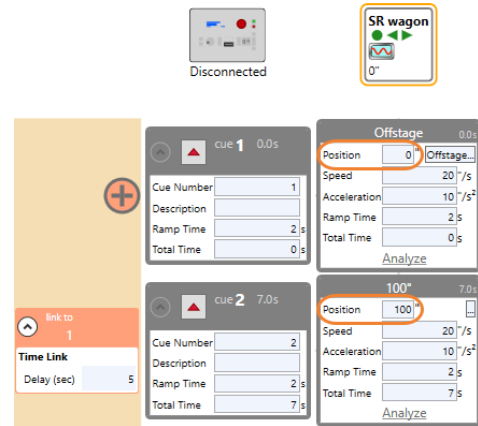
"PING-PONG" A MOTOR—CHANGING A MOTOR'S POSITION

Making a "Ping Pong" Motor effect creates an "infinite" loop, where the motor travels between two positions *without coming to a hard stop*. Instead the motor gracefully decelerates to zero-speed, changes direction, and then immediately accelerates in the opposite direction.

Since the "Ping-Pong" effect creates an "infinite" loop, in order to end the movement, you will have to interrupt the sequence by using any of the following: the Stop on the Cue Controller; the Stop All Cues, the Emergency Stop button on the Showstopper, or a "Soft Stop Motor" Input Action with a Stagehand FX.

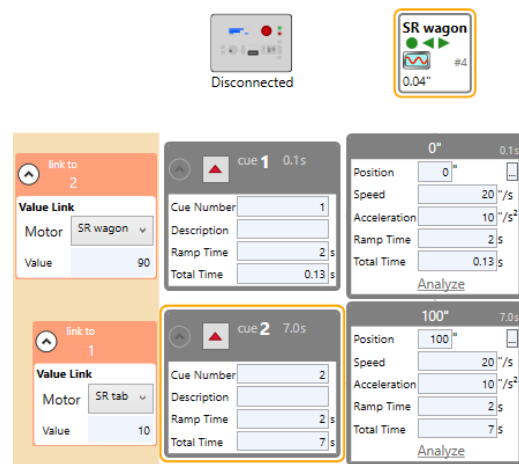
1. Write two cues with different Position targets for the same motor.

In the example, the Position targets are “0” and “100.”



2. Link the two cues together with a Position Link or Time Link.

In the example, Cue 1 links to Cue 2 and Cue 2 links to Cue 1, with Position Links.



NOTE:

When linking two cues to create a "ping-pong" effect, do not use a Completion Link, as this will bring the motor to a complete stop. Use a Time Link or Position Link in order to slow the motor to an imperceptible stop, creating a more fluid look for the position change.

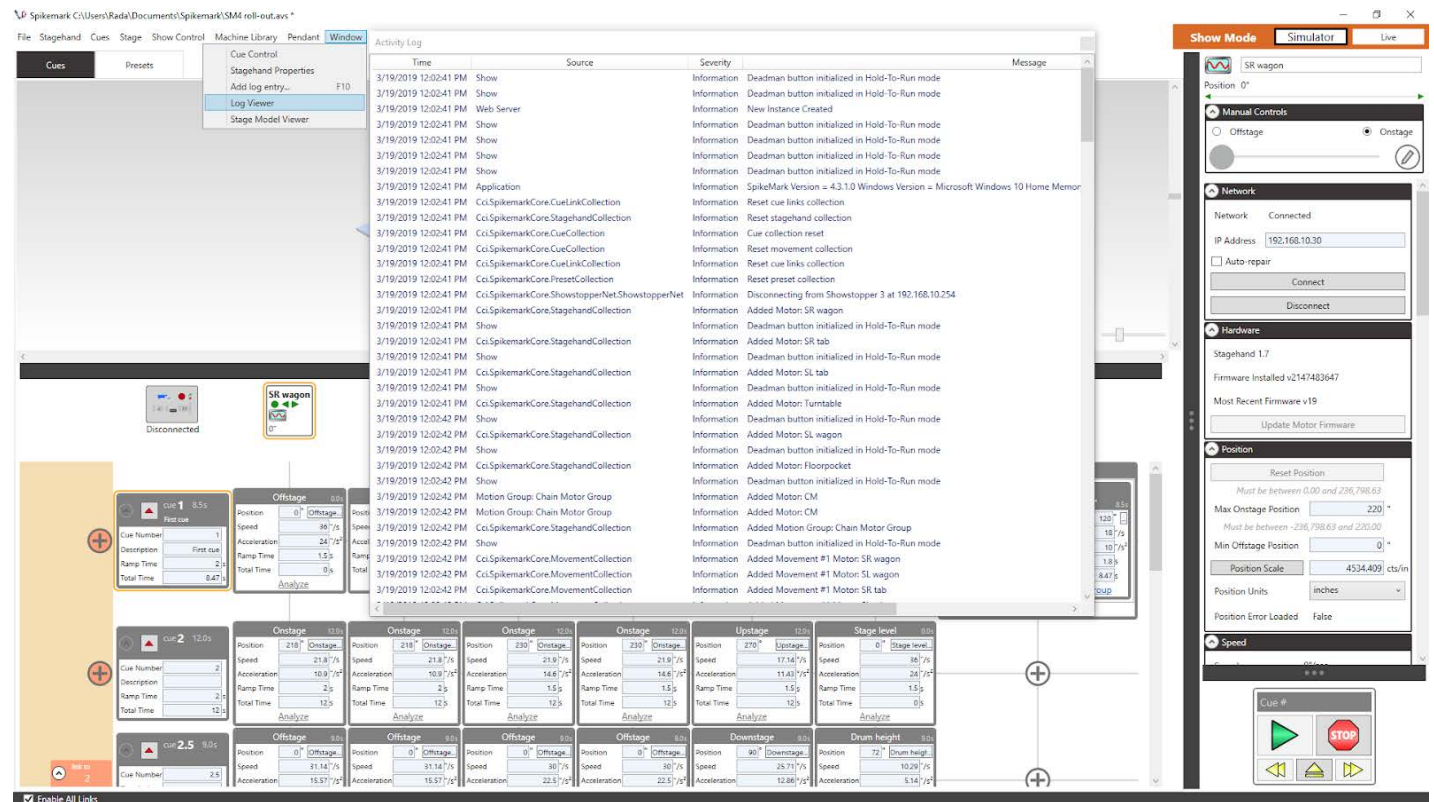
ACTIVITY LOG

We briefly mentioned the Activity Log as an item to check when you're troubleshooting an issue. Spikemark uses the Activity Log to record important information about what is happening behind the scenes to actually run your show.

LOG VIEWER

The Activity Log can be viewed in a couple of different ways. The most immediate way is inside Spikemark, through the Log Viewer. This can be opened by clicking on **Window** in the Menu Bar, and

selecting Log Viewer. A keen eye can use the Log Viewer to identify potential issues or errors that Spikemark might be encountering, and to monitor Spikemark processes in real time.



In addition to having a live Activity Log, Spikemark creates Log Files when closing that save the same information, but in a simple text (.log) file format. The easiest way to find these files is from Spikemark - navigate to the HELP menu and select REVEAL LOG to open a File Explorer window. These files can be opened using any text editor (Notepad or Notepad++), Excel or with our super awesome online viewer application: <https://creativeconners.com/logviewer.html>.

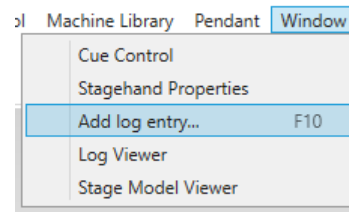
ADD LOG ENTRY

If you continue to run into an issue while running a show (such as a cue or link isn't firing), the first items Creative Connors, Inc support will ask for are the showfile, the last several log files and the approximate time of the error or issue. This allows us to quickly navigate inside the Log File and hopefully figure out the root of your issue.

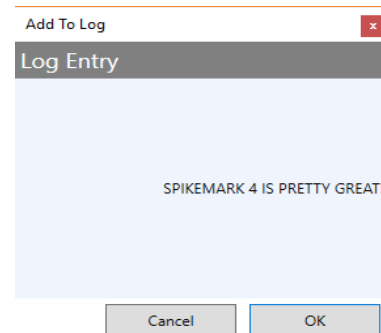
What is even better, however, is adding a Log Entry. Doing this will insert an entry into the Activity Log which can be labelled, and allows an event to quickly be tagged and found.

1. Click on the Window option in the Menu Bar and select Add log entry...

Or, you can use the hotkey F10 to open the Add To Log window.



2. Enter a brief description of the error (time permitting), and press OK.



You can search for “Add Log Entry Command” in your Log Viewer of choice, and see the message you typed.



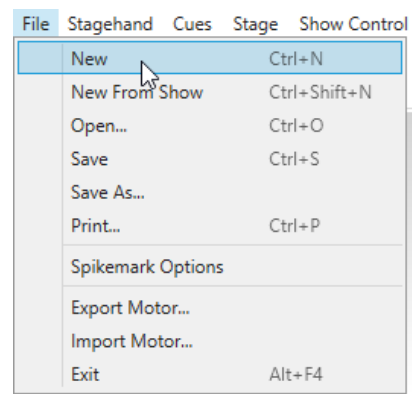
RUNNING SHOWS

All of the setup, configuring, and cue writing is, in the end, just a prerequisite for what you really need to do—run a performance. As the balance of writing in this manual may indicate, running a show is actually the easiest part of the process. Thankfully, by doing all your preparation attentively, running a show is easy. We'll look at a few ways to execute cues, navigate through the show, and explain what to do when something doesn't work as you expected.

OPENING SPIKEMARK

NEW SHOW

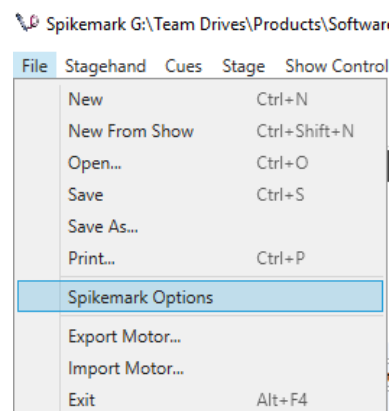
When Spikemark first opens, it adds a single motor and a single cue to the show. You can start editing the motor and cue as a starting point for your show. If you would like to begin with a blank slate, you can create a new show by clicking New in the **File** menu.



CUSTOM DEFAULT SHOW

Many people use the same show over and over again, especially if you have a permanent installation with all the same gear. Creating and setting a Default Show allows Spikemark to open directly to that show file without specifically finding and selecting that file every time.

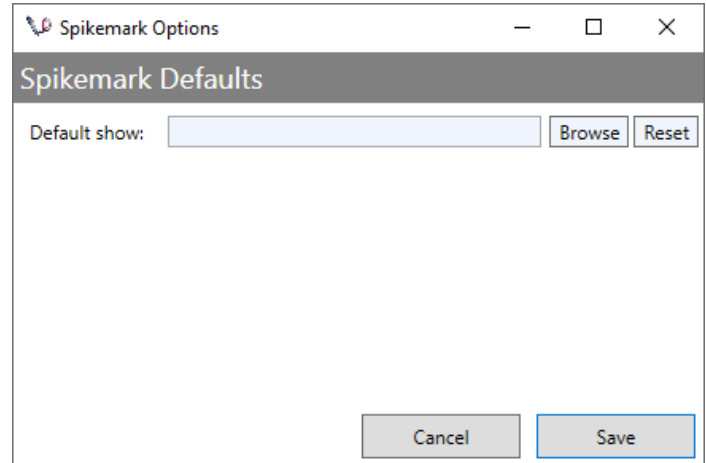
1. Click on **File** in the Menu Bar and select Spikemark Options. This will open the Spikemark Defaults window.



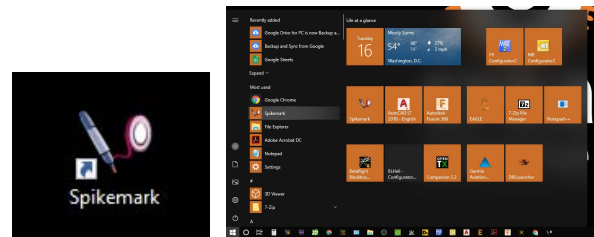
2. Select **Browse**, and this will open a Windows Explorer window where you can find the Show File you would like to use as your default.

Once selected, the input field next to Default Show: will fill with the location of your show file.

Click Save and the Spikemark Defaults window will close. Once you close Spikemark and open it again, that new default show file will automatically open.



3. Open Spikemark from the Start Menu or Desktop Icon to open directly to your Custom Default Show

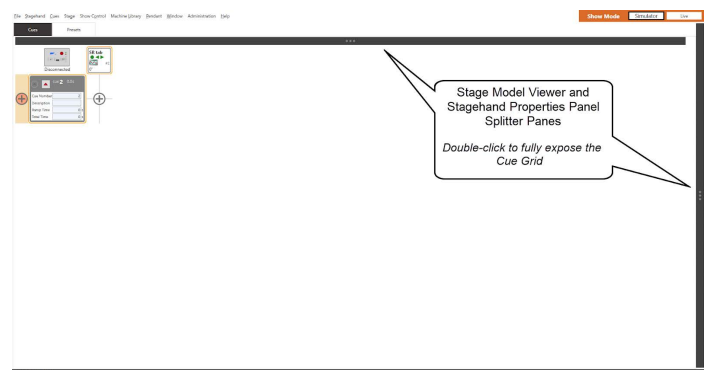


SETTING UP THE WORKSPACE

Once you've finished writing and editing cues, there are a few things you may want to arrange differently in the interface to see the appropriate amount of information. The way in which you like to set up the user interface is a personal preference, so the points outlined here are merely suggestions.

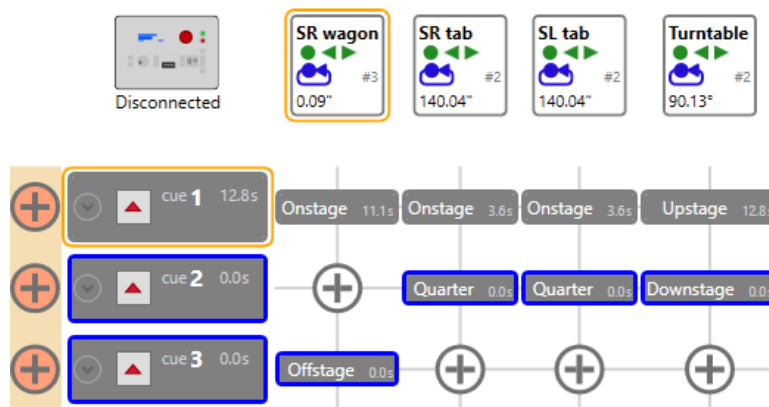
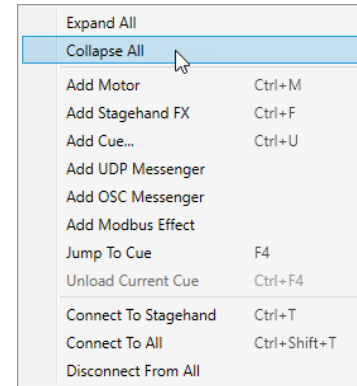
In the steps below, we'll expand the Cue Grid to take up the whole screen by double clicking on the Splitter Panes to minimize the Stagehand Properties Panel and the Stage Model Viewer. Next, we'll add a Stage Model Viewer that will sit on top of the Spikemark main screen by clicking Stage Model Viewer in the Window menu. Resize and arrange to your liking.

1. Expand the Cue Grid to its full size by double clicking on the dark grey **Splitter Panes** between the Cue Grid and Stage Model Viewer and the Stagehand Properties Panel's.

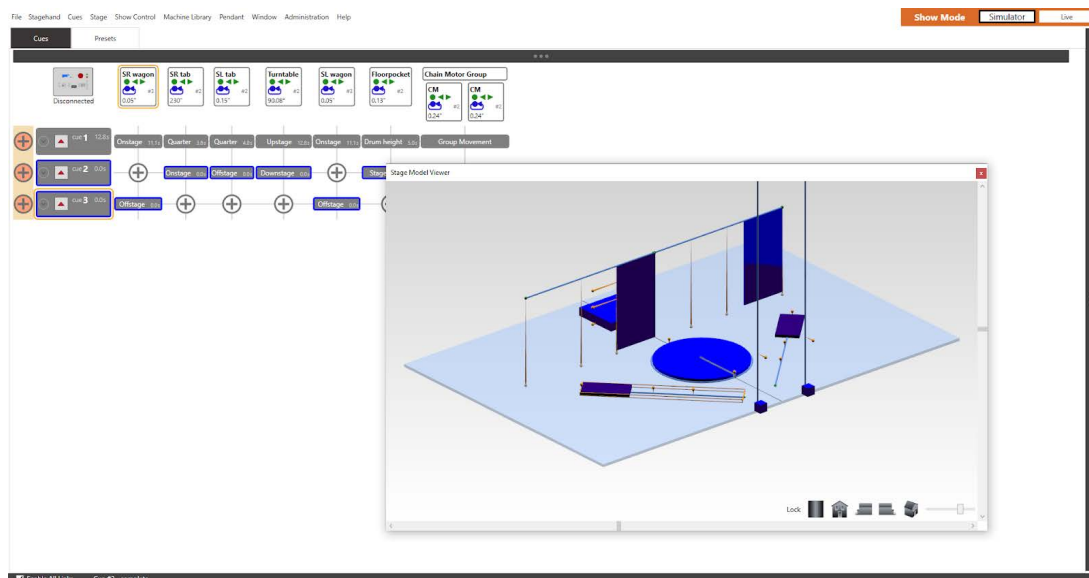


- Hide all the speed and acceleration information for the cues by right-clicking in the Cue Grid and selecting Collapse All.

This will compact the Cue Grid while allowing you to see the time each cue will take and the positions of every motor.



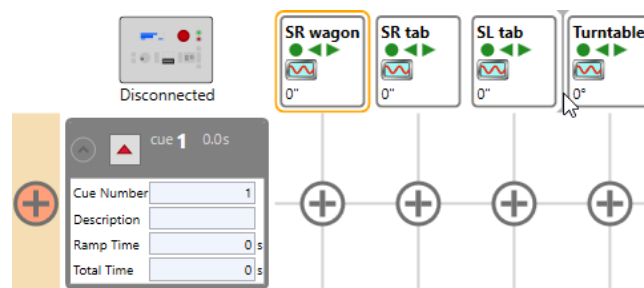
- In the **Window** menu, click Stage Model Viewer to create a floating Stage Model Viewer. Position the Stage Model Viewer in some unoccupied space of the Cue Grid or drag it over to a second monitor.



REARRANGING THE CUE GRID

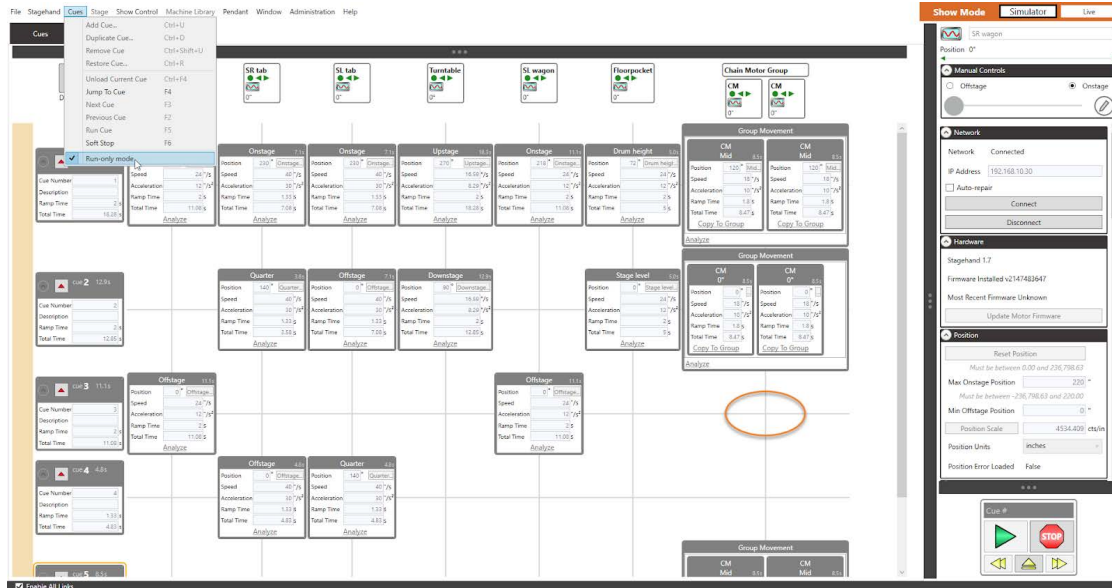
By default, motors appear as columns in the Cue Grid in the order in which they were created. While that's sensible to Spikemark, it probably bears no significance to you. Luckily, you can rearrange the columns of the Cue Grid to follow the logic of your show.

1. Click on the Stagehand you wish to move and drag it left or right. An indicator line will appear beneath your cursor. Drag that line where you would like to place the selected Stagehand in the order.



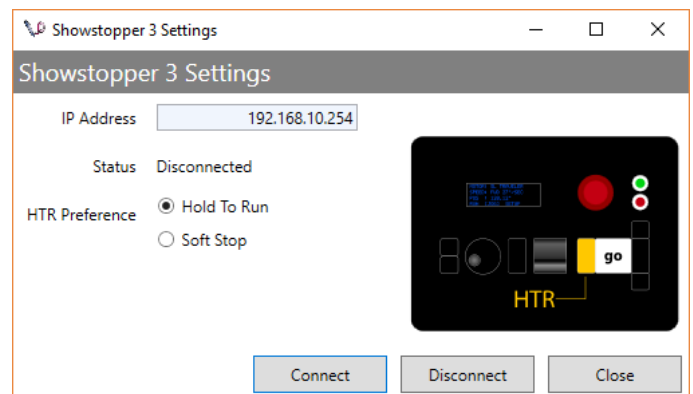
RUN ONLY MODE

Once a show has been programmed and finalized, it's pretty rare to want to change anything during the run. Enabling Run Only Mode, will disable the ability to edit the input fields, editing the stage, adding machines, editing cues, movements, and links. This mode can be turned on and off by clicking on the Cues option in the Menu Bar, and then clicking on Run-only mode at the very bottom of that sub menu. A check mark beside it will indicate that Run Only Mode has been activated, and you'll notice that the add movement plus signs disappear, and input fields and text are greyed out.



CONNECTING THE SHOWSTOPPER 3 CONSOLETTTE

1. Click on the Showstopper 3 Consolette (SS3C) Icon in the top left corner of the Cue Grid to open the Showstopper 3 Settings Window.
2. The SS3C will display Disconnected and an IP Address (192.168.10.254). Confirm this IP Address matches in the IP Address input field and click Connect at the bottom of the window.



3. The Showstopper 3 Settings Window will automatically close, and the SS3C Icon will show that it is Connecting.
4. Once a connection has been established, the SS3C Icon will turn black and display



Connected.

NOTE: If you are NOT using a Showstopper 3 Consolette, make sure that the status says Disconnected. If Spikemark is attempting to connect to a SS3C when there is none, eventually the network will time out, causing Spikemark to execute a precautionary Soft Stop.

CUES

LOADING A CUE

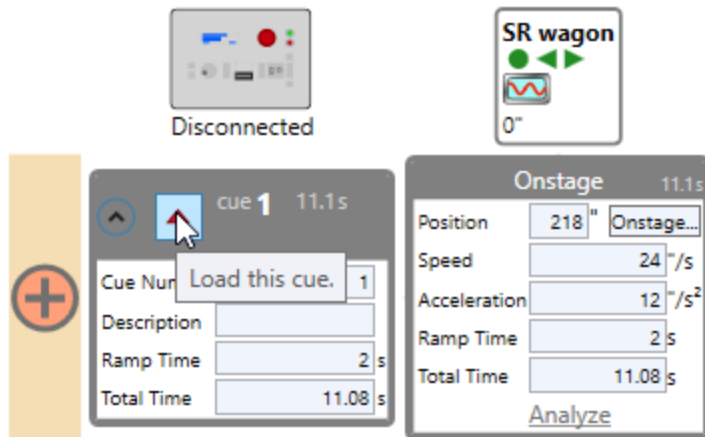
Executing a cue is a two step process. The first step is to load the cue. Loading the cue, sends all the cue information out to the Stagehand Controller or FX and gets the motors ready to move. Typically, you'll load a cue when your stage manager (the person calling your show, not our controller) gives you a "warning" for the cue.

NOTE:

Cues that are linked do not need to be explicitly loaded, as the link will *automatically* load and execute its child cue. If a Child Cue is manually loaded prior to the link being triggered, the link will NOT execute a GO command.

There are a few ways to load a cue. The difference is a matter of personal preference.

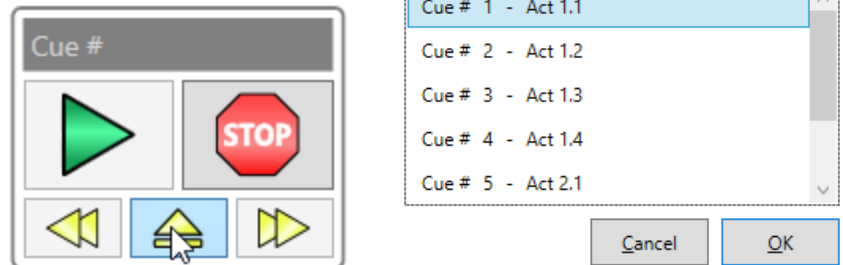
1. Click the Load Cue button in the **Cue Grid**.



-- OR --

2. Click the Jump To Cue button on the **Cue Controller** (Figure 321) and then select a cue from the Jump to Cue dialog box.

You can also type a cue number or description to jump to the cue.



-- OR --

3. If a cue was loaded or ran previously, you can use the Next Cue and Previous Cue buttons in the Cue Controller.



-- OR --

4. Press the Load Cue button on your Showstopper 3 Consolette and select a cue from Jump to Cue dialog box.

UNLOADING A CUE

After you've loaded a cue, and your hand is hovering on the GO button, you may get the news over your headset that "it's going to be a while". Rather than leave the cue loaded and one accidental click away from running, you may want to unload the cue and return Spikemark to an idle state. There are five ways to unload the currently-loaded cue, use any method that is most convenient:

1. Press the Soft Stop button on the Consolette
2. Engage the E-Stop
3. Press the on-screen Stop button (cue controls)

4. Select Unload Current Cue from the **Cues** menu.

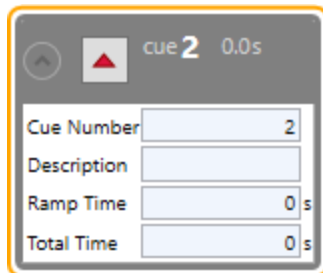
Add Cue...	Ctrl+U
Duplicate Cue...	Ctrl+D
Remove Cue	Ctrl+Shift+U
Restore Cue...	Ctrl+R
Unload Current Cue	Ctrl+F4
Jump To Cue	F4
Next Cue	F3
Previous Cue	F2
Run Cue	F5
Soft Stop	F6
Run-only mode	

5. Right-click on an empty portion of the **Cue Grid** and select Unload Current Cue from the pop-up menu.

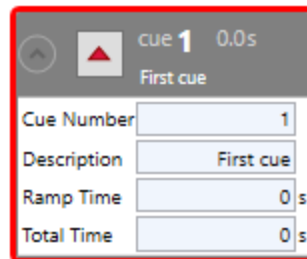
Expand All	
Collapse All	
Add Motor	Ctrl+M
Add Stagehand FX	Ctrl+F
Add Cue...	Ctrl+U
Add UDP Messenger	
Add OSC Messenger	
Add Modbus Effect	
Jump To Cue	F4
Unload Current Cue	Ctrl+F4
Connect To Stagehand	Ctrl+T
Connect To All	Ctrl+Shift+T
Disconnect From All	

VISUAL INDICATORS

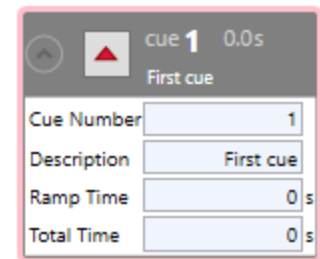
Spikemark uses colors to indicate the state of a cue or movement. These outline colors help to quickly identify a cue is ready to go, moving, complete or in a fault state.



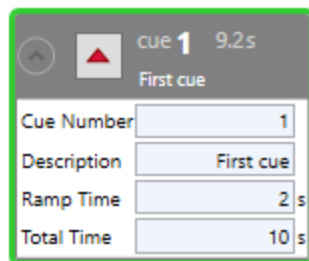
Selected



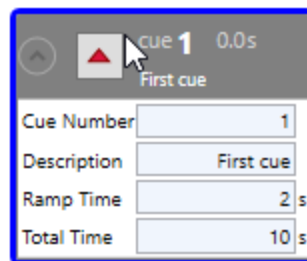
Cue Loaded



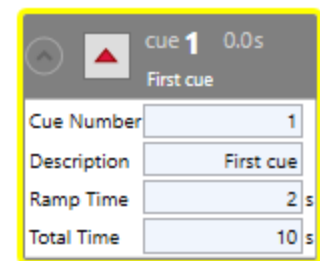
Partially Loaded



Cue Running



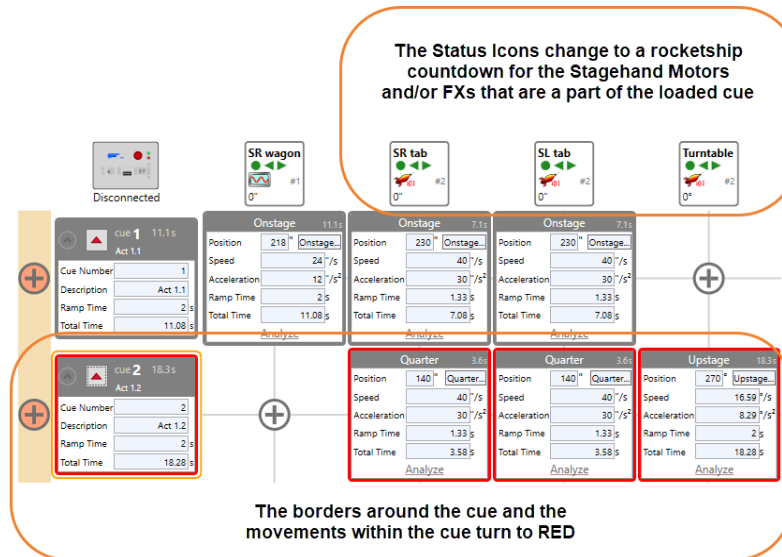
Cue Complete



Cue Faulted

1. In the Cue Grid, the borders around the ready cue and ready movements change to red and the Stagehand column headers display a rocket ship countdown icon.

For a complete list of status icons and their meanings, see the “Motor Status” section on page [22](#) and the “FX Status” section on page [23](#).

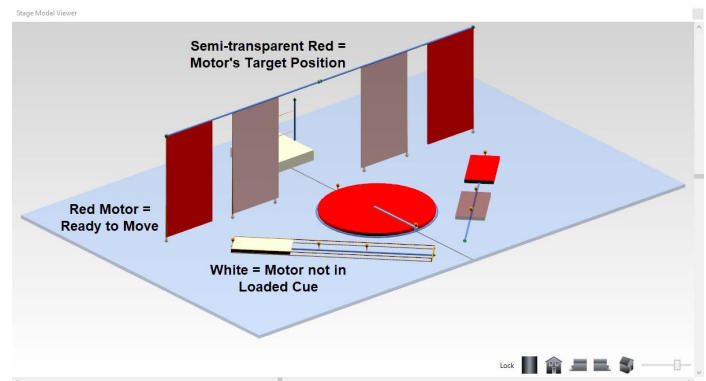


NOTE:

If only some of the Stagehands were able to load the cue, the cue outline will turn pink indicating a partially loaded cue. This can occur if a Stagehand is not currently connected to Spikemark.

2. The status bar text updates in the bottom left corner of Spikemark.
3. The motor(s) that will move in the loaded Cue change to red and their target position(s) are shown in semi-transparent red inside the Stage Model Viewer.

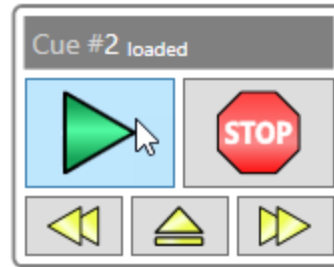
(Note: The Turntable's target position in the example below is the thin, semi-transparent red line that sits down stage, nearest the lift. The blue line is the current position.)



RUNNING A CUE

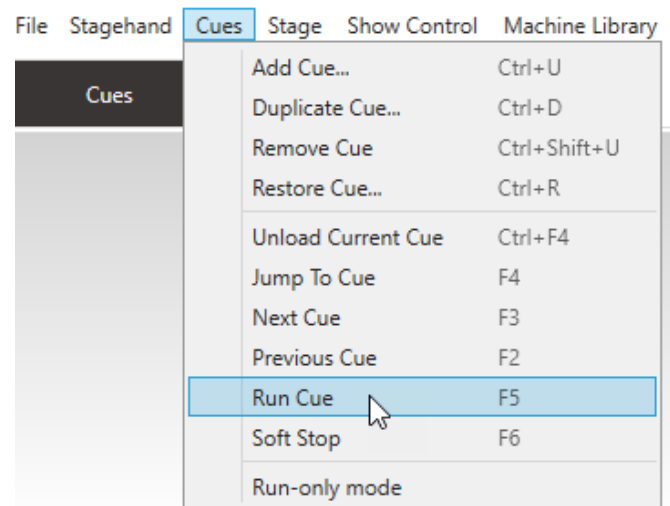
Once a cue is loaded, you can start all the motors moving by running the cue. There are a few ways to run a cue.

1. You can press the Go button in the **Cue Controller**.



-- OR --

2. Click Run Cue in the **Cues** menu (*Figure 328*).



-- OR --

3. Press **F5** on the keyboard.

-- OR --

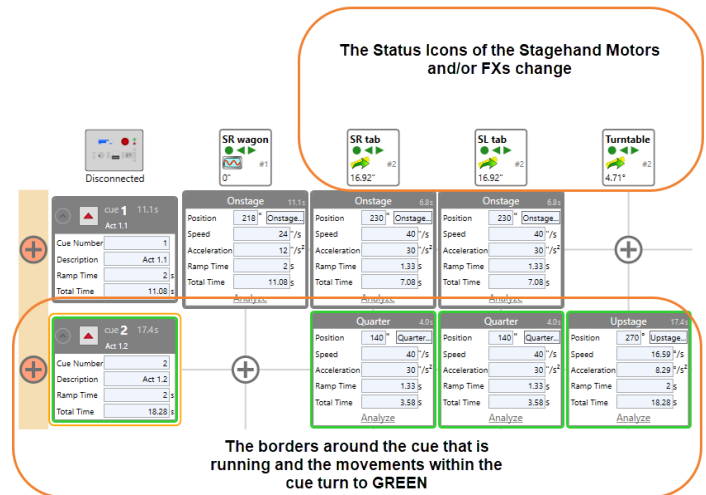
4. Press the **Go Cue** button on your Showstopper 3 Console.

WHAT HAPPENS WHILE A CUE IS RUNNING

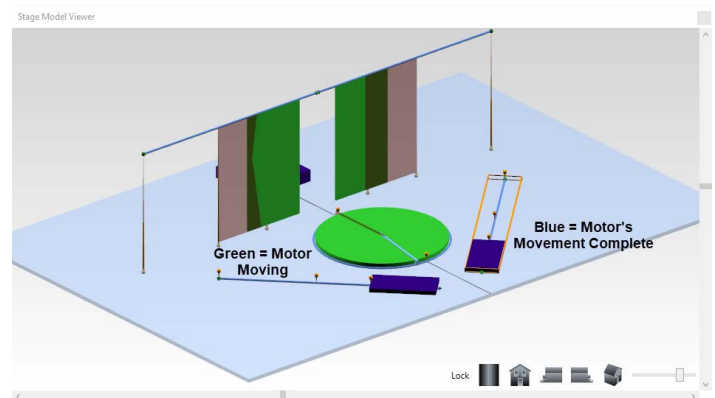
Once the cue is running, the interface changes to inform you exactly *what* is running.

1. In the Cue Grid, the border around the Cue that is running and motor movements within the running Cue change to green and the Stagehand status icons change.

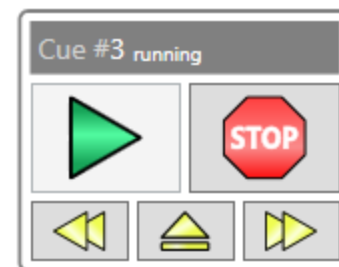
For a complete list of status icons and their meanings, see the “Motor Status” section on page [11](#) and the “FX Status” section on page [12](#).



2. The motor(s) that are moving in the Cue change to green inside the Stage Model Viewer.



3. The status text in the Cue Controller displays which cue is running.



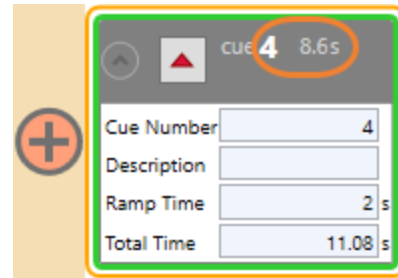
4. The Status Bar text in the bottom left corner of the Spikemark screen displays which cue is running.



NOTE:

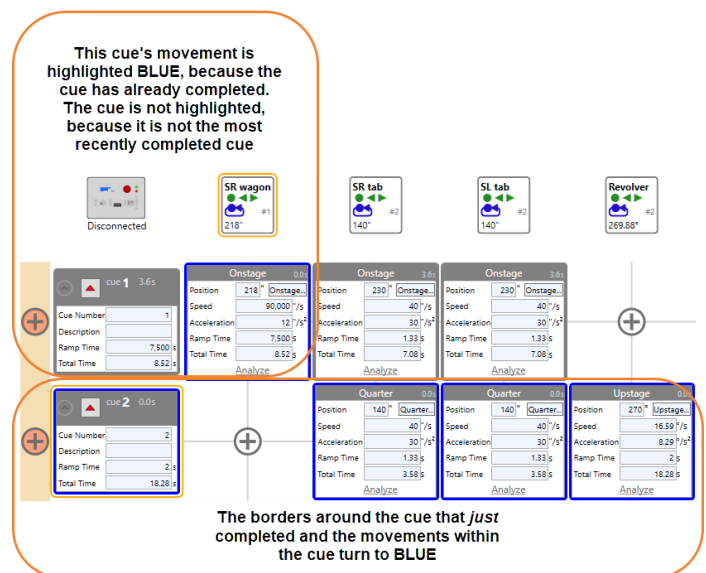
If you have *multiple cues* running at the same time, the Status Bar and Cue Controller only show the last cue started.

- The Cue row header in the Cue Grid will display a Countdown Timer in the upper right corner showing how much time is left until the cue is complete.

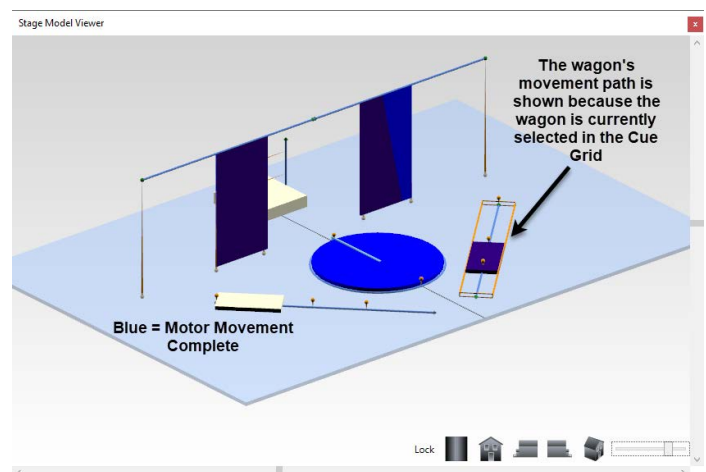


WHAT HAPPENS AS MOTOR MOVEMENTS AND CUE(S) COMPLETE

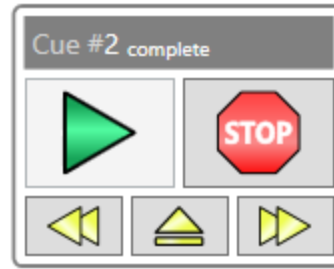
- As the motor movements and the cue complete, the interface shifts colors again and the borders in the Cue Grid turn blue.



- The motor(s) that have completed their movements in the Cue change to blue inside the Stage Model Viewer.



3. The Cue Controller on your screen updates its status text.



4. The Status Bar text in the bottom left part of the Spikemark screen is updated.



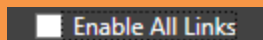
RESTORING A CUE

Spikemark's Cue Restore feature allows you to move backwards through a show during rehearsal. Cue Restore will put every motor back into its proper position for a specific cue, regardless of whether the motor was moving in that cue or had its last movement in a previous cue. If that sounds confusing, it is straightforward in practice. Let's take a look at how the feature works, and you'll see that it does exactly what you need when jumping backwards in rehearsal.

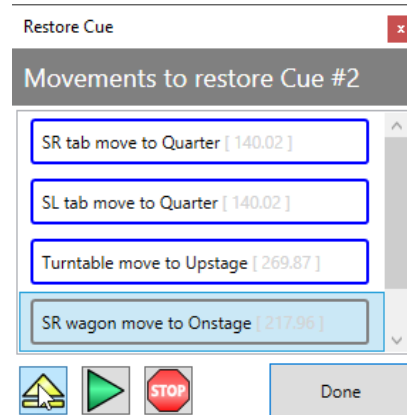
In the following example, assume that we just ran through Cue 4, and the stage manager needs to re-run Cue 4 because Jeff, the lighting designer, needs to look at the transition again. We like Jeff and want to make running the transition for the automation easy so Jeff can easily do his job. As you glance at the cue sequence below, you can see that we need to reset the stage so that we are sitting in Cue 3 but there's a problem. You can't just run Cue 3 to reset. If you were to just run Cue 3, then Motor 1 would be left in its "home" position. So you would need to run Cue 3 and Cue 2. Not a big deal in this scenario, but as you have more motors and more complex cues, restoring can be a real pain. Thankfully, Cue Restore can handle this easily.

NOTE:

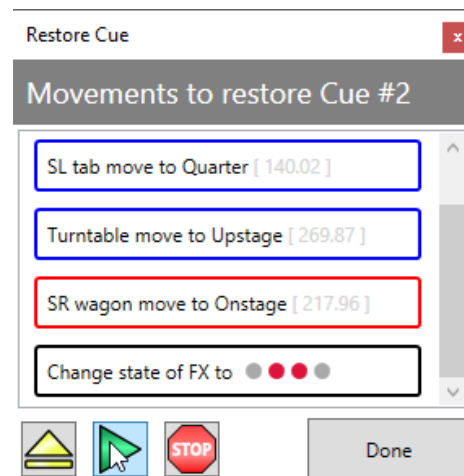
The checkbox in the status bar at the bottom of the Spikemark main screen—"Enable All Links"—can be used to turn off cue links. The Cue Restore feature *automatically* deselects the Enable All Links field [pictured below] in the status bar at the bottom of the Spikemark main screen, so that cue links are not accidentally triggered during a Cue Restore.



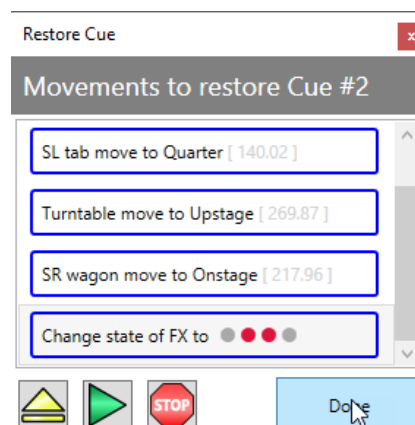
1. To start moving motors back into their correct positions, select a single movement from the list and then press the Load Movement button in the Restore Cue window.



2. After one movement is loaded, you can press the Run button in the Restore Cue window. Then—if it is safe—load the next movement and run it as well. Load and run the movements one by one.

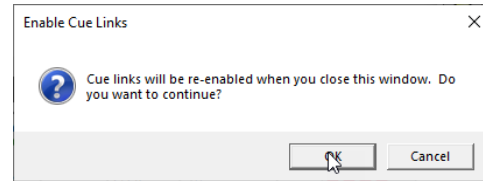


3. When you are finished restoring all the motors, press the Done button to close the Restore Cue window.

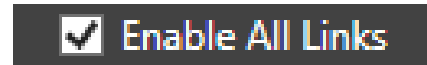


4. Click OK in the Enable Cue Links dialog box to re-enable all cue links.

If the motors have not finished moving, click Cancel.



5. Notice that in the status bar in the bottom left-hand corner of the Spikemark main screen, the Enable All Links box is once again selected.

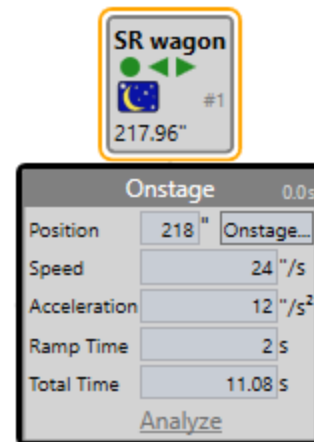


6. Cue 4 is restored and ready to run again.
Repeat the steps to restore the cue again, if needed.

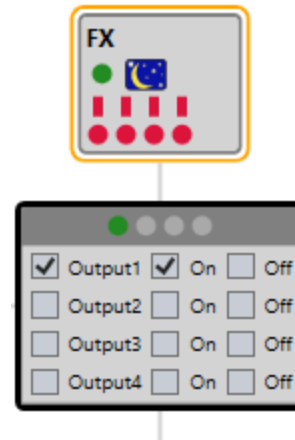
DEACTIVATING A MOTOR

Occasionally a motor will fault or otherwise not function properly while teching or running a show. To easily exclude a motor from the show without affecting the operation of cues or links, you can deactivate it by right clicking on the axis header or unchecking the "Active" check box in the Stagehand Properties panel. Deactivated motors display a sleepy moon and are greyed out.

If the motor has been Deactivated the background of the motor and all its movements will turn grey and that motor will not move when you run a cue with movement that moves that motor.

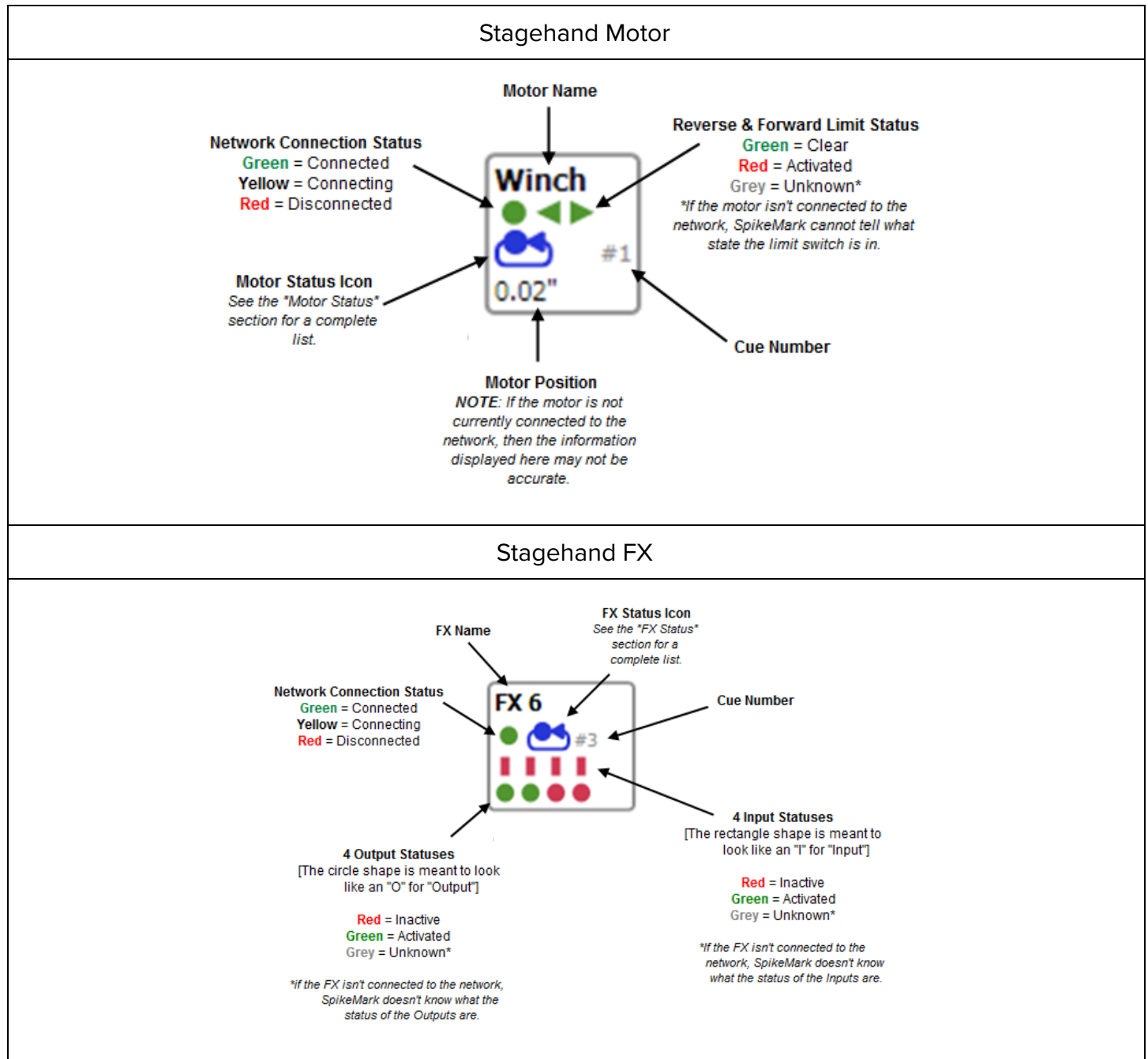


If the Stagehand FX has been Deactivated the background of the motor and all its movements will turn grey and that motor will not move when you run a cue with movement that moves that motor.



STAGEHAND MOTOR STATUS

In the heat of a performance, you are likely to feel compelled to obsessively check that your motors and FXs are all connected, happy, and ready to run. There's no shame in that compulsion, it's what makes you a good automation operator. If there is a problem, you want to know about it so that you can fix it quickly and be ready to run your next cue. Spikemark feeds that hunger for status reports with a few key signals in the interface. The Cue Grid header cells give you quick status information about every Stagehand Controller and FX.



STAGEHAND STATUS ICONS

Motor status information is displayed next to the motor name in the Stagehand Properties Panel and in the Cue Grid column headers. Each icon status is described below.

Icon	Status	Icon	Status
	Motor disconnected from the network.		Running a cue forward in target-tolerance mode.
	Motor connected to the network, but idle.		Running a cue forward in strict-timing mode.
	Motor is inactive and won't run cues or affect cue links		Running a cue reverse in target-tolerance mode.
	Motor has completed a cue.		Running a cue reverse in strict-timing mode.
	Drive fault		Stopped by a forward limit switch on the motor.
	Emergency stop.		Stopped by a reverse limit switch on the motor.
	Cue loaded.		Stopped by a position error fault.
	Soft stopping, but not yet fully stopped.		Brake fault
	Stopped mid-cue by a soft-stop command.		Stopped by an Ultimate Limit.
	In manual mode with the motor enabled, but zero-speed.		Stopped by a group fault.
	Moving forward in manual mode.		A firmware update is available.
	Moving reverse in manual mode.		
	Stagehand FX: An output is active in manual mode.		Stagehand FX: One (or more) output(s) is running in a cue.
			Stagehand FX: All outputs have been turned off because of a fault condition

ACTIVITY LOG

We briefly mentioned the Activity Log as an item to check when you're troubleshooting an issue. Spikemark uses the Activity Log to record important information about what is happening behind the scenes to actually run your show.

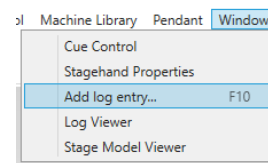
ADD LOG ENTRY

If you continue to run into an issue while running a show (such as a cue or link isn't firing), the first thing CCI support will ask for is the showfile, the last several log files, and the approximate time of the error or issue. This allows us to quickly navigate inside the Log File and hopefully figure out the root of your issue. What is even better is adding a Log Entry.

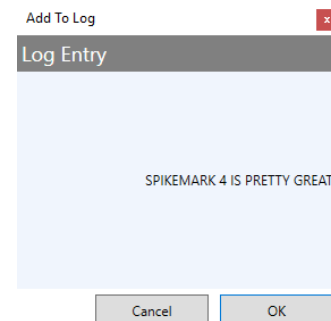
Doing this will insert an entry into the Activity Log which can be labelled, and allows an event to be quickly tagged and found.

1. Click on the **Window** option in the Menu Bar and select 'Add log entry...'

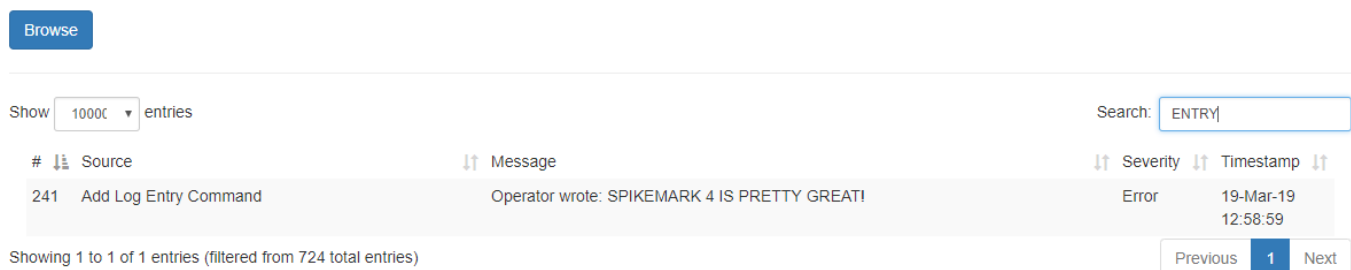
Or, you can use the hotkey F10 to open the Add To Log window.



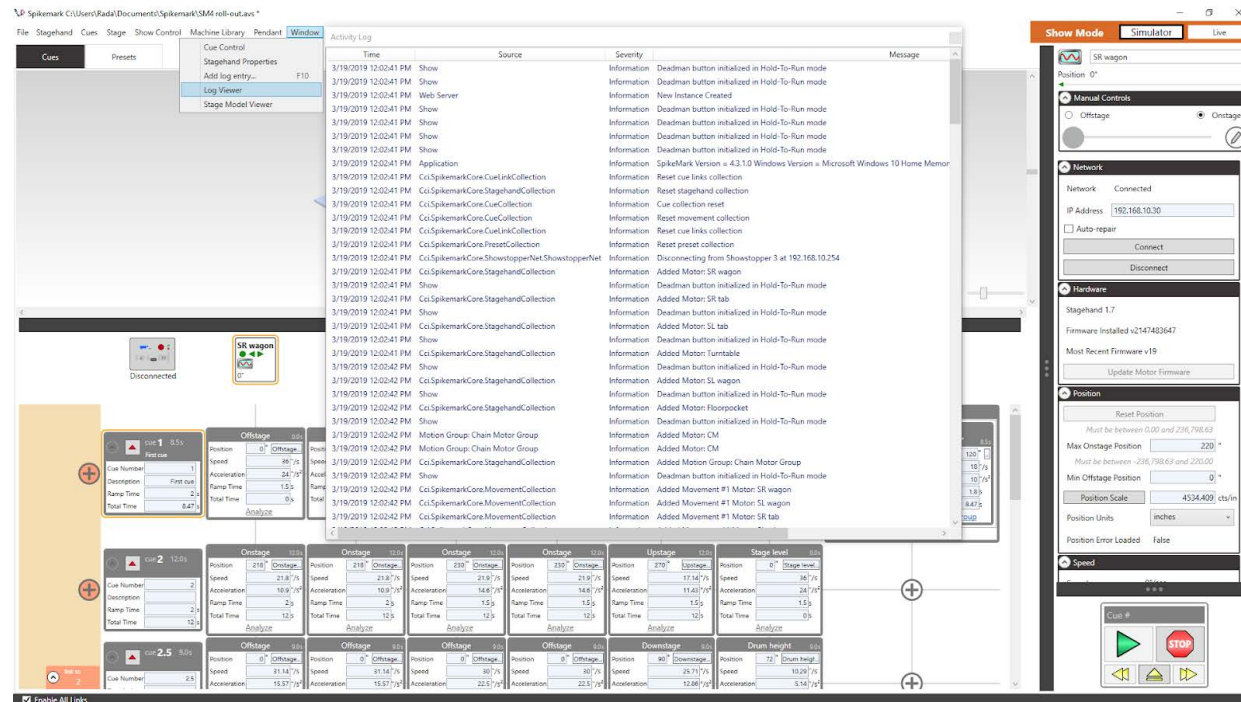
2. Enter a brief description of the error (time permitting), and press OK.



You can search for "Add Log Entry Command" in your Log Viewer of choice, and see the message you typed.



The Activity Log can be viewed in a couple of different ways. The most immediate way is inside Spikemark, through the Log Viewer. This can be opened by clicking on **Window** in the Menu Bar, and selecting Log Viewer. A keen eye can use the Log Viewer to identify potential issues or errors that Spikemark might be encountering, and to monitor Spikemark processes in real time.



In addition to having a live Activity Log, Spikemark creates Log Files when closing that save the same information, but in a simple text (.log) file format. The easiest way to find these files is from Spikemark - navigate to the HELP menu and select REVEAL LOG to open a File Explorer window. These files can be opened using any text editor (Notepad or Notepad++), Excel or with our super awesome online viewer application: <https://creativeconners.com/logviewer.html>.

TROUBLESHOOTING

When automation works well, it's a fun and wondrous technology. When automation doesn't work it's hair-pulling, and frustrating black-magic. If you've made it to this part of the manual, I assume you are at the hair-pulling stage. Here we will try to help answer some of the more common problems and solutions here.

If these suggestions don't address your specific problem or you are stuck with what question to ask, drop us an email (support@creativeconners.com) or give us a call at 401-289-2942 x2. We love solving mysteries!

SPIKEMARK

Below are the most common Spikemark challenges encountered in the world.

GENERAL INSTABILITY/ODD BEHAVIOUR

If you are experiencing strange behaviours from Spikemark, including partial connections to Stagehands or Showstopper devices, you probably have multiple instances of Spikemark running and attempting to connect to the same devices.

Exit Spikemark and reboot the PC, reopen the showfile.

INSTALLATION

- Uninstall all versions of Spikemark currently installed
- Install the most recent Spikemark release
- Though Spikemark can be installed on a PC connected to a Windows domain, you will not be able to access the log file location or the OSC libraries. Motor firmware will also be hidden away under the admin user.

LOGGING IN

- In order to log into Spikemark, user authorization must be enabled and Spikemark must be installed according to the Authorization guidelines.
- User authorization will not function on a PC connected to a Windows domain.
- Creative Connors does not manage the users or passwords. If you have forgotten your password please see your Supervisor.

PROGRAM CRASH

- Occasionally Spikemark will crash. Most often a ZIP file will appear on the desktop - please email it along with the show file and last three log files to support@creativeconners.com.

- If you updated Spikemark and it is now unstable, please downgrade to the previous version.

LOG FILE LOCATION

- The easiest way to find the log files is by navigating from the HELP menu to REVEAL LOG which will open a File Explorer window. Sort by creation date for the most recent files.

MACHINE LIBRARY

- Don't sweat it if you delete a stock machine - you can open a previous show file with the machine and add it to the library.

SPLITTER BAR MISSING

- On rare occasions the cue grid/stage model viewer splitter bar can go missing - so you will only see the stage model. Use Ctrl+s then exit Spikemark. Re-open Spikemark and all should be restored.

INCORRECT SHOW LOADING

- Opening Spikemark doesn't open the default show OR you have set up the computer to open a specific show and now it's not.
 - Use the Windows+E combination to open a file explorer window. From here you should see a "Recent Files" list.
 - Right click on the correct show file and select Open File Location.
 - Use this location to reset the Default Show File in Spikemark.

UNSTABLE NETWORK CONNECTIONS

Network stability is paramount to successful operation. Most often you will notice network issues when attempting to run a cue or move a motor - the status icon will be a flat line and the network status will be Yellow.

1ST STEPS

1. Confirm the Spikemark computer is still connected to the network with the correct IP Address
 - a. 192.168.10.245 is the recommended default
2. Confirm the network switch is powered on
3. Check the network cable between the PC and network switch
 - a. Reset both ends of the cable
 - b. Replace the cable

SINGLE STAGEHAND

1. Confirm device IP Addresses are identical on the device and in Spikemark

2. Confirm the Stagehand is displaying “DISCONNECTED” and the proper IP Address
 - a. If displaying “SET IP”, confirm the IP Address and click “OK”
3. Check network cable
 - a. Reseat cable
 - b. Replace cable

MULTIPLE DEVICES

- Check network cable between Spikemark PC and network switch
- Check network switch for power
- Check network cables from switch to Stagehand
- Reboot PC

SHOWSTOPPER CONSOLETTTE

- Follow the above network connection steps to confirm Spikemark is connected to the network
- Use the device jog wheel to confirm the IP Address matches between the device and Spikemark
- Check the network cable
 - Reseat both ends of the cable
 - Replace the cable
- Reboot the device
 - Unplug the Accessory cable from the Consolette and wait 15 seconds before plugging back in

SPIKEMARK PENDANT

- Follow the above network connection steps to confirm Spikemark is connected to the network
- Confirm “Enable Pendant” is checked from the Pendant menu in Spikemark.
- Confirm IP Addresses and Ports match on the Pendant and in Spikemark
- Check the network cable
 - Reseat both ends of the cable
 - Replace the cable
- Reboot the Pendant from the Spikemark Menu
 - Unplug the Accessory cable from the Pendant and wait 30 seconds before replugging
- Double check the [port settings and firewall settings on the PC](#)

CONNECTING TO OTHER SYSTEMS

- Confirm IP Addresses match
- If not using a 2nd NIC (network interface card), install a second card and configure to connect to the remote system

STAGEHAND

Though the Stagehand controller is plug and play, there can be challenges, below are the most common

GREYED OUT

- The Stagehand is Deactivated, and displays a Moon and Stars status icon in Spikemark
 - Right click on the Axis header and select “Active”

DISCONNECTED/WON'T CONNECT

- See [network section](#) above
- Reboot the Stagehand

DRIVE MODEL UNDETECTABLE

- Confirm Spikemark is in Live mode
- Confirm the Stagehand is connected and ready
- Drive Model is only available on the Stagehand Apprentice and Stagehand Pro controllers

FIRMWARE VERSION

There are two reasons why the most recent firmware version displays UNKNOWN:

Show file opened directly

1. By double clicking on your show file, Spikemark points to the incorrect directory for the firmware, so it is unable to display the correct information.
2. To remedy this, open Spikemark from the desktop shortcut or the Start menu
 - a. Use File - Open to open your show file

Admin user rights

1. Spikemark is installed under a different user (your PC is controlled by the IT Department and you do not have admin rights) and the firmware files are installed under that admin user.
 - a. You will need to check out the [release notes](#) for Spikemark and use the [Firmware Updater](#) tool to manually install the [correct firmware](#).

FAULT

Stagehand faults can be caused by many factors. The quickest way to identity the fault includes:

- Consult the [Stagehand Status Icons](#)
- View the [Log file](#)

- Note any drive fault codes from the VFD or Drive Status pane and email them to support

CUE ACCURACY

Issues with cue target accuracy are frustrating, let's look at the most common reasons:

- Target Tolerance is set too high
 - The motor gets close each time, but could be a little long or short
- Motor tuning needs to be addressed
 - The motor always comes up short
- Position scale needs to be adjusted
 - The motor will always return to zero (or the reset position point) but will not accurately travel out.

TURNTABLES

On top of the above points, turntables pose their own challenges. Most often this has to do with position scaling - specifically with how the dancer wheel encoder moves along the edge of the turntable.

1. Check encoder wheel accuracy with this [handy guide](#).
2. Rescale the turntable using the position scale wizard - spinning a minimum of 4 times (1440 degrees)

POSITION LOST

Occasionally you may notice that your motor believes it is off-stage when it is really on-stage, or something similar. Most likely this has to do with the Stagehand Controller rebooting prior to Persistent Position updating. You will need to manually reset the position to the known position.

UNCONTROLLED MOTION

Jogging the motor manually works just fine, but when moving in cue the motor goes full speed in the opposite direction. The command and encoder signals are out of phase.

- Confirm when jogging FWD the encoder counts are increasing and REV the encoder counts are decreasing
- Change the direction the motor is spinning by swapping motor output phases
- Change the direction the encoder is spinning by swapping outputs A and B and /A and /B

WON'T RUN IN A CUE

- Check network connection
- Confirm Spikemark is in Live Mode
- See Cue section below

E-STOP TRIGGERS FX

- Your effect is wired incorrectly - rewire to ensure power off ends in a safe state

CUE CONTROL

Challenges with cues can be caused by connectivity issues, mechanical issues or Stagehand faults.

SETTINGS LOCKED

If you are unable to make adjustments to cues or add movements, you will need to disable Run Only Mode from the Cues menu or log into Spikemark as a user with editing rights.

TOTAL TIME

Occasionally setting the total time for a cue or individual movement will not work as expected.

- I set the total time to one value, but Spikemark changed it to something larger
 - The cue cannot be completed in the duration you entered and Spikemark has adjusted the total time for reality.
 - Adjust max speed (with testing) or overspeed the motor to attain the desired total time.

ALL CUES UNLOADING

Check the Console status - it is most likely displaying "Connecting":

- Check Console connection to Spikemark
- Disconnect from Console if you are not using one

SOFT STOPPING

Cues load and begin to run but soft stop during cued motion

- The console is disconnecting - check network configuration and stability
- The Soft Stop button is being triggered
- The HTR button is released while motion is active

CUE WON'T LOAD

- Check e-stop state
- A Stagehand in the cue is faulted - clear the fault
- Close and restart Spikemark

CUE WILL NOT RUN

See All Cues Unloading and Soft Stopping above

The cue is loaded and turns green but no motion happens in the real world

- Confirm the motor is not sitting on a hard limit
 - Manually back off the limit and run the cue again

Motor turns Yellow

- Check limit states
- Check Fault States

CUE FAULTS

The most common cue fault is a Position Fault. Adjust the Motor Tuning, MPE or Position Lag Time to allow cue to complete without faults

POSITION ISN'T ACCEPTED

The target position is outside of the soft limits, adjust the target position or the soft limit

CUE LINK NOT TRIGGERING

The parent cue is faulted or partially loaded when the child cue executes. This is common when a Stagehand FX is in the parent cue along with motion.

Move the FX to a 0 time link cue

CUE LINK SOMETIMES TRIGGERING

The parent cue is faulted or partially loaded when the child cue executes. This is common when a Stagehand FX is in the parent cue along with motion.

Move the FX to a 0 time link cue

GROUPS

Motion groups fault in similar ways to regular movements.

JOGGING

- Group jogging will not go fast enough
 - Confirm individual motor speeds are set properly

- Confirm group jog speed is set properly
- Confirm Max Jogging Speed is set properly

GROUP FAULTS

Group faults can be caused because of an individual axis faulting or due to timeouts