



# **APEX Firing System Software User's Guide**



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## 1 Introduction

This document is the Software User's Guide for the APEX Firing System, Software version 1.0. Ensure that you have read and understand all information in this guide before using the APEX Firing System software. This firing software, combined with the APEX Firing System hardware, provides the flexibility to fire pyrotechnic displays of any size and complexity.



Be sure to read this software guide in its entirety prior to using the APEX Firing system software.

### 1.1 Software Features

The APEX Firing System software, combined with the APEX Firing System hardware, provides the following features:

- Automatic USB Connectivity (no COMM port assignments!)
- Firing rate of 30 frames per second
- Multi-Module Simultaneous Firing (one cue from up to 20 different modules fired simultaneously)
- Repeat cue firing
- Script verification with error reporting useful for script correction
- Field continuity-to-script comparison with easy to read icons, discrepancy summary, and quick cue info lookup to make pre-show field checks simple and easy.

### 1.2 System Requirements

Supported Operating Systems	<ul style="list-style-type: none"><li>• MS Windows XP</li><li>• MS Windows Vista</li><li>• MS Windows 7</li><li>• MS Windows 8</li><li>• MS Windows 10</li></ul>
PC Hardware requirements	<ul style="list-style-type: none"><li>• Any hardware that meets the minimum requirements of the Operating System it is running is sufficient for running the APEX Firing System software.</li><li>• Available USB port for connection to APEX Firing System USB CIM (Computer Interface Module)</li></ul>
APEX USB CIM (Computer Interface Module) and compatible modules/firing equipment.	

### 1.3 Updates In This Version

Feature Enhancements:

<b>Enhancement</b>	<b>Description</b>
<b>Automated Show Firing</b>	
Added Simultaneous Cue Firing From Individual Module	Added the ability to fire multiple cues from the same module at the same time. Limitations: M32 - 8 cues simultaneous (single ematch per pin) M144 - 8 cues simultaneous (single ematch per pin) M156 - Legacy M156 modules are not able to fire simultaneous cues.  Verifications that these limitations are not exceeded when a script is loaded was also added.
<b>Continuity</b>	
Improved Speed of Pin Continuity Results Grid Display	The speed at which the software displays the Pin Continuity Results was improved (for example, when switching between modules).
<b>Touch Panel</b>	
Added Touch Panel Timer	Timer was added to the Touch Panel Screen. Timer starts when the first cue is fired. Stop and Reset button were also added.
Cancel Active Sequence Button Added to Touch Panel	A "Cancel Active Sequence" button was added to the touch panel. Button will halt firing of all Sequences which are actively firing. Re-firing of sequences which were cancelled will resume firing from the point the sequence was cancelled.
Increased Number of Available Sequences	The number of available sequences was increased to 99.
Increased Maximum Number of Events per Sequence	The number of events per sequence was increased from 100 to 300.
Improved Touch Panel Display Speed When Switching Between Modules	Improved Speed of "Cue Firing Panel" Grid Display to allow quicker switching between modules during firing.
Touch Panel Module Selection Is Retained	The selected Touch Panel Module now remains selected after navigating away from the Touch Panel and then back.
Sequence Button Color Indication While Firing	Sequence buttons now change colors from green to blue and back to green while firing as a visual indicator that sequence firing is in progress.
<b>Tools</b>	
Effect Descriptions Added to "Disable Cue Selection List"	The Effect Descriptions are now listed in the "Disable Cue Selection List" on the Tools page. Filtering of list based on Effect can be done either by: 1. Selecting Effect from the Drop Down List 2. Type a portion of the description in the Effect Description field.
Current Play Time Displayed During Music Test	The Test Music now includes an updating time display of the current music position. This serves as a visual indication that the music is, in fact, playing... so, you know, turn up the volume.

Enhancement	Description
<b>Sequence Builder</b>	
"Auto Add Delay" in Sequence Builder	Added an "Auto Add Delay" feature to the Sequence Builder. When enabled, the entered delay will automatically be added after each cue that is added to a sequence.
Add Entire Slat to Sequence	In the Sequence Builder, added the ability to click the slat letter (M144/M156) to add all pins from that slat to the sequence.
Delay Value Modification	Added the ability in the Sequence Builder to modify the delay value in a delay that has been added to a sequence. This is done directly on the delay object in the "Selected Sequence Detail Pane"
Improved Speed of Cue Grid Display	The speed at which the software displays the Cue Grid in the Sequence Builder Window was improved (for example, when switching between modules).
Added Keyboard Shortcuts for Editing Sequence Items	Within the "Selected Sequence Detail Pane", the following keyboard shortcuts can now be used: Item Selection Up/Down... Up/Down Key Move Selected Sequence Item Up... Page Up Key Move Selected Sequence Item Down... Page Down Key Delete Selected Sequence Item... Delete Key
<b>General</b>	
Maximize APEX Firing Screen On Launch	The APEX Firing Software now launches maximized to take full advantage of screen space.
Enhanced Multiple Tooltips	Numerous tooltips were added or improved. (Tooltips are the little messages that display when you hover the mouse pointer over items on the screen).
Added Support for Windows 10	APEX Firing Software has been tested and is now supported on Windows 10.

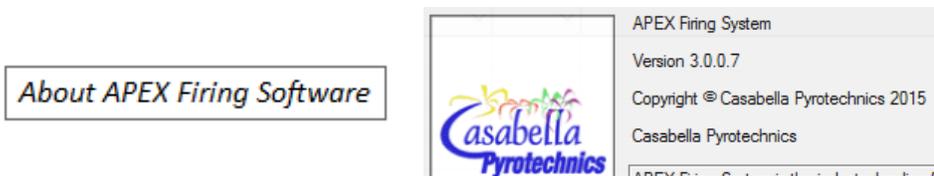
Bug Fixes:

- Firing View: Fixed the coloring of disabled cues in the Cue Fire List.
- Fixed functionality of splitter between Touch Panel "Module List" and "Cue Firing Panel" (resizing of the Module List now works)
- Fixed Module Swap Tool so that Continuity Results, Discrepancy Summary and Pin Descriptions reflect swapped module.
- Fixed coloring of disabled cues during firing on the Cue Firing List.



**Prior version of APEX Firing Software MUST be uninstalled prior to installing the new version** (Control Panel → Programs → Uninstall or Add/Remove Programs → "APEX Firing System Software" → Uninstall)

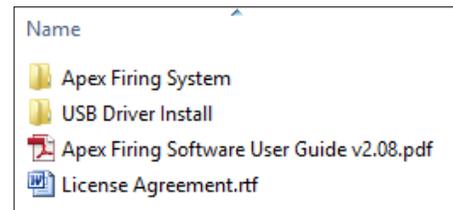
To verify you have the latest version installed, select "About APEX Firing Software" on the Tools tab.



## 2 Software Installation

Installation of the APEX Firing Software is a simple process. Before starting, if a previous version of the APEX Firing Software is installed, uninstall it through Windows Control Panel ("Program and Features" or "Add or Remove Programs", depending on Windows Operating System).

If the software install file is a single compressed zip file, extract/unzip it prior to installation. The install package should contain files as shown in the image to the right.



Then, follow the steps below.

1. If you have previously installed a prior version of APEX Firing Software, the prior version must first be uninstalled. In Windows Control Panel, find and select the **APEX Firing System Software** in the list of installed programs, then click the "Uninstall" button at the top

APEX Firing System Software	Casabella Pyrotechnics	4/27/2015	1.0.0.4
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2. Read the APEX Firing Software License Agreement:

**Apex Firing Software**

Read the License carefully before using the Software. By using the Software you agree to the terms and conditions of this License.

1. **Trademarks and Logos:** This License does not authorize Licensee to use any name, trademark or logo.
2. **Disclaimer of Warranty:** Software is provided "AS IS," without a warranty of any kind. ALL EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE HEREBY EXCLUDED.
3. **Limitation of Liability:** CASABELLA PYROTECHNICS SHALL NOT BE LIABLE FOR ANY DAMAGES SUFFERED BY LICENSEE OR ANY THIRD PARTY AS A RESULT OF USING OR DISTRIBUTING SOFTWARE. IN NO EVENT WILL CASABELLA PYROTECHNICS BE LIABLE FOR ANY LOST REVENUE, PROFIT OR DATA, OR FOR DIRECT, INDIRECT, SPECIAL, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF THE USE OF OR INABILITY TO USE SOFTWARE, EVEN IF CASABELLA PYROTECHNICS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

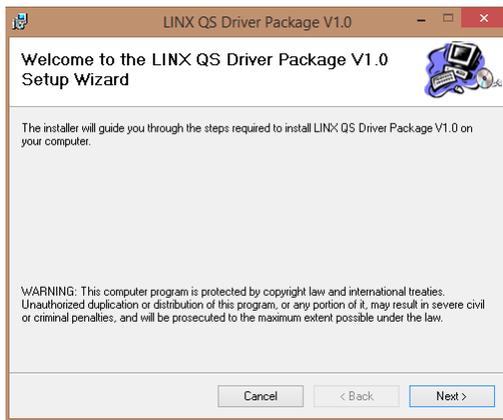
**Note:** If a prior version of the APEX Firing Software was installed and used with a USB CIM, the USB Driver is already installed and step 3 below can be skipped. If executed with the driver installed, a message to either repair or remove the USB driver will be displayed. **This confirms that the USB Driver is installed.** Either cancel at this message, or select **Repair** and continue.

3. Within the **USB Driver Install** folder, run the **QS Driver Installer.msi**:

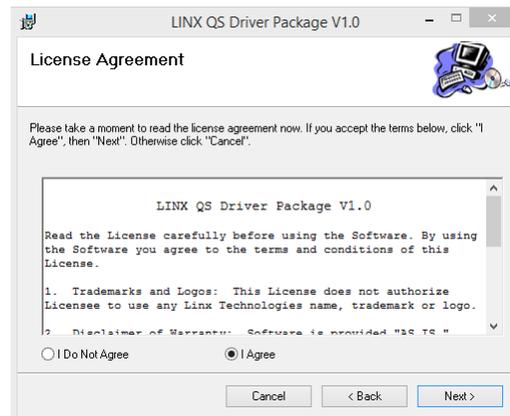
Name	Date modified	Type	Size
Apex Firing System	5/29/2015 9:48 PM	File folder	
USB Driver Install	5/29/2015 9:49 PM	File folder	
Apex Firing Software User Guide v2.08.pdf	5/13/2015 10:00 PM	Adobe Acrobat D...	2,423 KB
License Agreement.rtf	2/21/2015 1:35 PM	Rich Text Format	35 KB

Name	Date modified	Type	Size
amd64	4/27/2015 2:01 AM	File folder	
i386	4/27/2015 2:01 AM	File folder	
dpinst.xml	3/30/2009 12:01 PM	XML File	1 KB
DPIInst_x64.exe	7/13/2009 5:12 PM	Application	663 KB
DPIInst_x86.exe	7/13/2009 4:47 PM	Application	540 KB
ftd2xx.h	2/25/2009 8:30 AM	C/C++ Header	23 KB
ftdibus.cat	3/26/2009 9:49 AM	Security Catalog	11 KB
ftdibus.inf	3/25/2009 1:42 PM	Setup Information	4 KB
ftdiport.cat	3/26/2009 9:49 AM	Security Catalog	10 KB
ftdiport.inf	3/25/2009 1:42 PM	Setup Information	6 KB
QS Driver Installer.msi	11/5/2009 3:07 PM	Windows Installer ...	1,483 KB

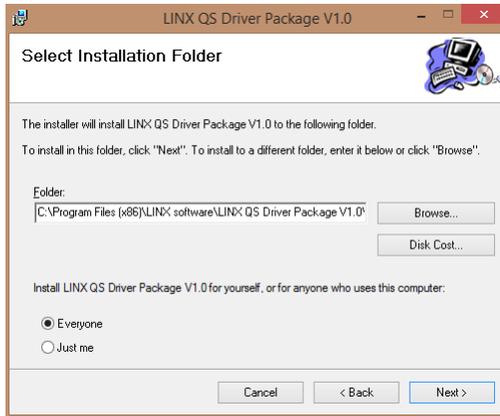
Complete the installation of the USB Driver by following the **LINX QS Driver Package** installation wizard.



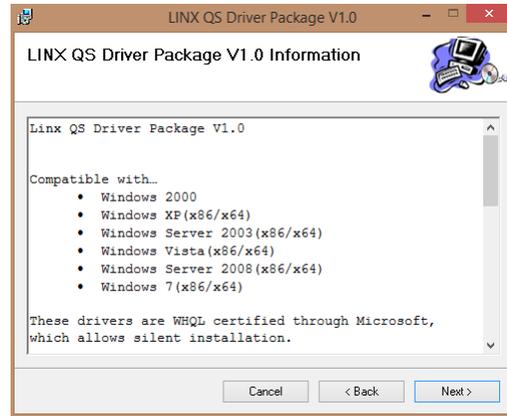
a. Click **Next**



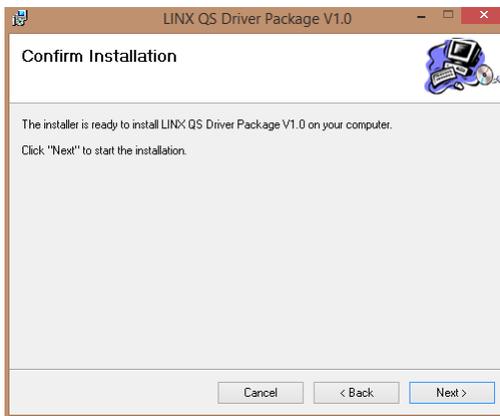
b. Check **I Agree**, then click **Next**



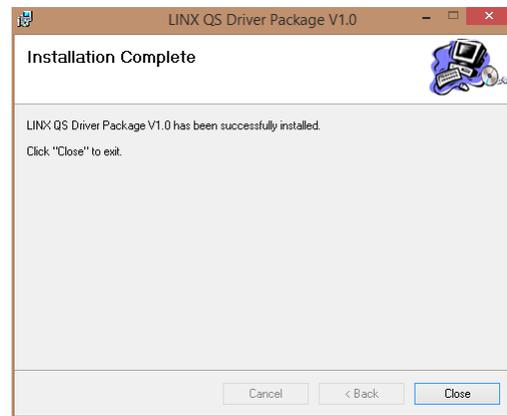
c. Check **Everyone**, then click **Next**



d. Click **Next**



e. Click **Next**. If a prompt appears asking if you want to allow the program to make changes to your computer, select **Yes**.

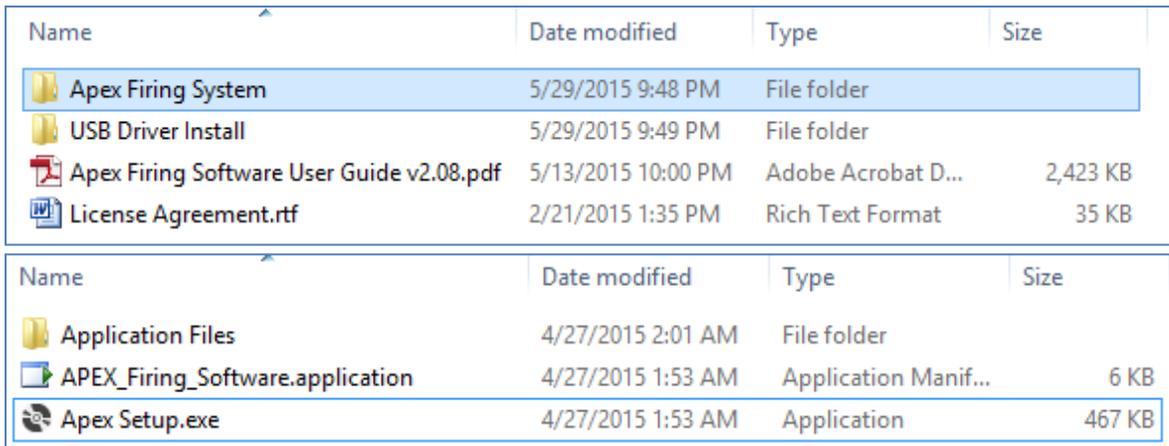


f. Ensure the Installation Complete screen indicates a successful installation, then click **Close**.



**NOTE:** USB Driver installation will complete once the USB CIM is connected for the first time. APEX Software installation can continue without USB CIM Connection. Software will display a message to indicate driver installation is not complete.

4. Within the **APEX Firing System** folder, run the **APEX Setup.exe**.



Name	Date modified	Type	Size
Apex Firing System	5/29/2015 9:48 PM	File folder	
USB Driver Install	5/29/2015 9:49 PM	File folder	
Apex Firing Software User Guide v2.08.pdf	5/13/2015 10:00 PM	Adobe Acrobat D...	2,423 KB
License Agreement.rtf	2/21/2015 1:35 PM	Rich Text Format	35 KB

Name	Date modified	Type	Size
Application Files	4/27/2015 2:01 AM	File folder	
APEX_Firing_Software.application	4/27/2015 1:53 AM	Application Manif...	6 KB
Apex Setup.exe	4/27/2015 1:53 AM	Application	467 KB

If a "Publisher cannot be verified" security warning is displayed, click **Install** to proceed.

The software installation will complete, and will launch the APEX Firing System Software. A shortcut to the APEX software will be created in Program Files, as well as on the desktop.

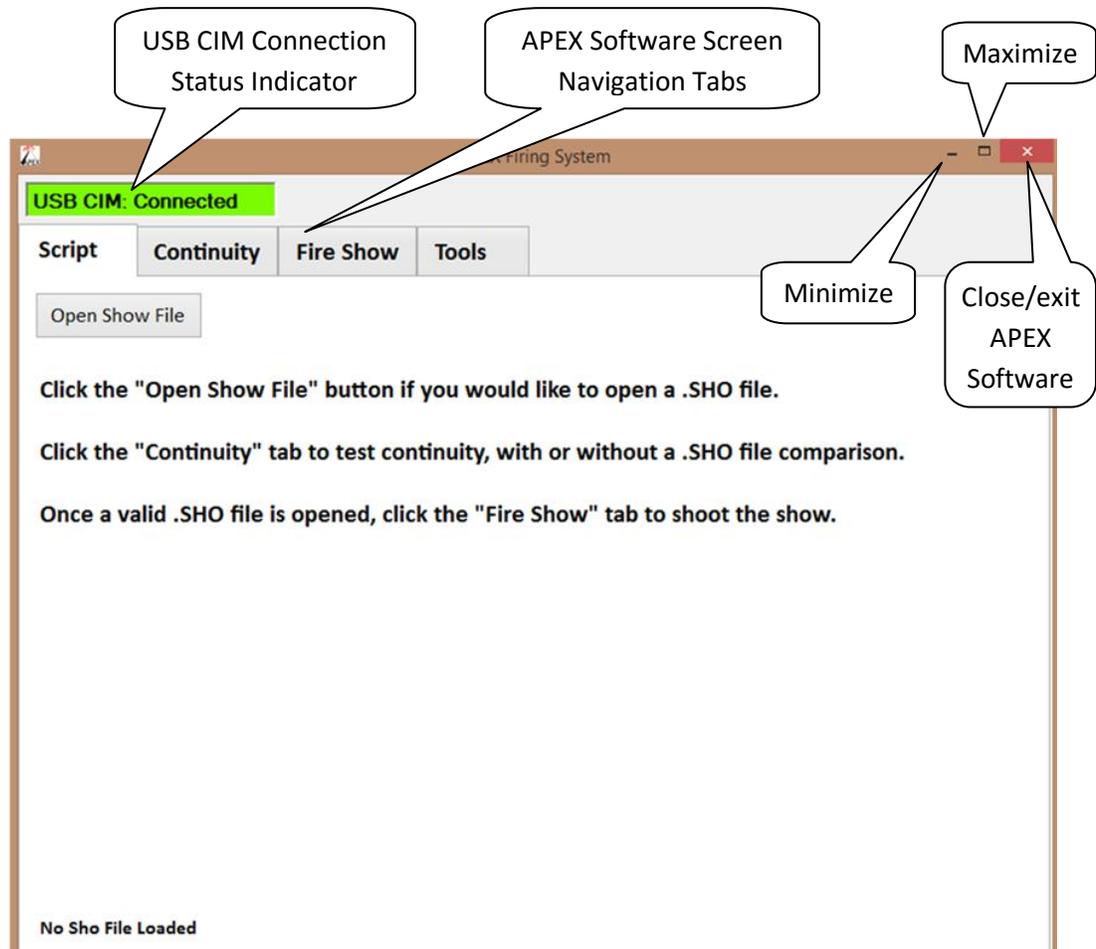
5. Connect the APEX CIM USB cable and power on the CIM. **If APEX USB CIM has never been connected to this computer, it may be necessary to close and re-launch the APEX Firing Software to complete initialization of USB Driver.** This is only necessary the first time the APEX USB CIM is connected to the computer.

### 3 APEX Software Overview

The main APEX Software screen is shown below. The tabs along the top allow navigation to the various software screens. Each of these screens and the functionality of each is described in detail in the sections of this document that follow.

The USB CIM Connection status indicator at the top of the main APEX window will display as green "Connected" or red "Disconnected" to indicate connection status of the APEX USB CIM.

The APEX Software can be closed, maximized, and minimized through the standard windows buttons at the top right.



## 4 Automated Show Firing

Automated firing of a pyrotechnic display is accomplished through a Show File (.sho) script. The use of Finale Fireworks™ visual choreography software is highly recommended for pyromusical show scripting and automated creation of APEX .sho file.



**Section 4.1 and 4.2** below describe in detail the required format for the .sho file. If you already have a .sho file, these sections can be skipped and referred to in the future as needed.

### 4.1 Required .sho Format

The script file extension is .sho, however, the contents are simple text with comma separated data values. It can be viewed/edited in a text editor or spreadsheet program (opened as a .csv - comma separated file).

In order for the APEX Firing Software to read, interpret, and fire an automated pyrotechnic display, the .sho file must be correctly formatted. The screenshot and table below describe the components and required formatting of a .sho file.

The screenshot shows a Notepad window titled "APEX Example .sho File.sho - Notepad". The script content is as follows:

```

REM, Script file exported by Finale Fireworks for Apex Firing Systems
music,C:\APEX Example Show\Example Soundtrack.wav
area,CloseProx,1
area,ColorShells,2
area,Salutes Left,3
area,Salutes Right,4
caliber,3
caliber,6
caliber,cake
module,1,m32
module,2,m144
module,5,m156
1,cake,1,,1,00:00:07:01,PFX13FR-6 White Strobe Mine
2,3,2,a,1,00:00:07:01, 3" White Strobe Willow
3,6,5,a,1,00:00:07:01,6" Salute
4,6,5,d,9,00:00:07:02,6" Salute
2,6,2,a,2,00:00:08:28, 6" Colorful Falling Leaves w 5 times Thunder
2,6,2,d,10,00:00:08:29, 6" Blue Windbells
2,6,2,g,1,00:00:09:00, 6" Blue Windbells
3,3,5,a,2,00:00:15:10,3" Salute
3,3,5,a,3,00:00:15:11,3" Salute
3,3,5,d,10,00:00:15:12,3" Salute
4,3,5,d,11,00:00:15:13,3" Salute
4,6,5,a,4,00:00:15:14,6" Salute
4,6,5,d,12,00:00:15:15,6" Salute
    
```

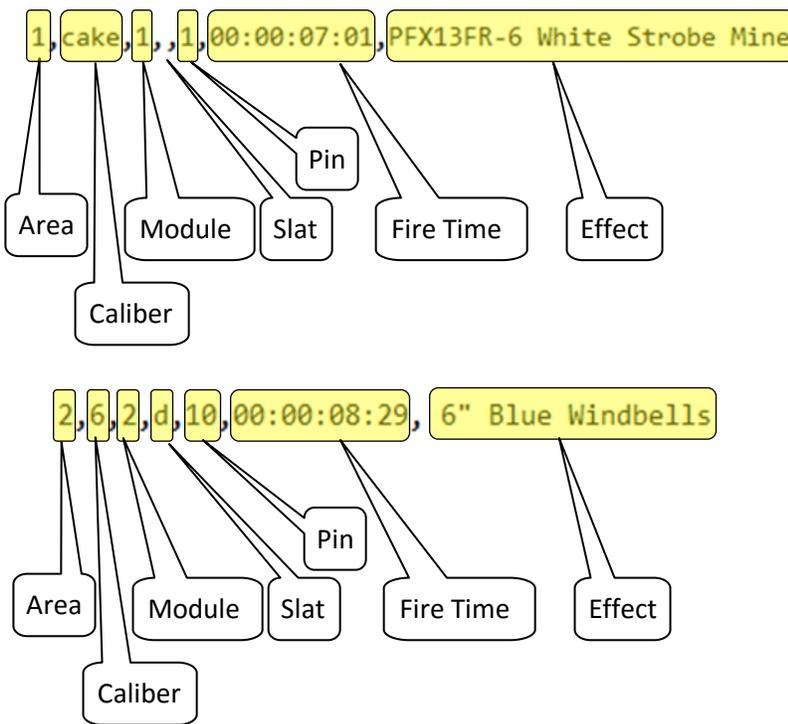
Callouts on the left side of the screenshot identify the following components:

- A. Comment:** Points to the first line: "REM, Script file exported by Finale Fireworks for Apex Firing Systems".
- B. Music File:** Points to the second line: "music,C:\APEX Example Show\Example Soundtrack.wav".
- C. Area Definitions:** Points to lines 3-6: "area,CloseProx,1", "area,ColorShells,2", "area,Salutes Left,3", "area,Salutes Right,4".
- D. Caliber Definitions:** Points to lines 7-9: "caliber,3", "caliber,6", "caliber,cake".
- E. Module Definitions:** Points to lines 10-12: "module,1,m32", "module,2,m144", "module,5,m156".
- F. Show Cues:** Points to lines 13-20, which are the numbered cue lines.



Components must occur in the order shown above (with the exception of Comments as described below), and with the formatting described in the table below.

	Component	Description	Required Component Format <i>Note the comma following each component identifier ("REM," "music," "area," etc.)</i>
A	Comment	Comments are completely ignored, and are not required. You can use comments to make notes or remarks for your own benefit.	<ul style="list-style-type: none"> <li>• Must begin with <b>REM</b>,</li> <li>• A comment can be added at any point in the .sho file.</li> </ul>
B	Music File	Full path and file name for the music file that will be played during firing of the show.	<ul style="list-style-type: none"> <li>• Must begin with <b>music</b>,</li> <li>• File path must be a valid windows file path</li> <li>• Music file must exist and be a ".wav" file</li> </ul>
C	Area (group) Definitions	Areas are defined to align with actual field positions in order to allow Show Cues to be assigned to the appropriate Area. <div data-bbox="451 737 946 892" style="text-align: center; margin: 10px 0;"> <p style="font-family: monospace; font-size: 1.2em;">area, Salutes Right, 4</p> </div>	<ul style="list-style-type: none"> <li>• Must begin with <b>area</b>,</li> <li>• Area Name can consist of letters and numbers</li> <li>• Area/Group Number must be a number</li> <li>• Each Area Name and Area Number value must be unique</li> <li>• There must be at least one area defined</li> </ul>
D	Caliber Definitions	Calibers are defined to align with caliber of products being fired in order to allow Show Cues to be assigned the appropriate caliber.	<ul style="list-style-type: none"> <li>• Must begin with <b>caliber</b>,</li> <li>• Caliber can consist of letters and numbers.</li> <li>• Each caliber value must be unique.</li> <li>• Must be at least one caliber defined</li> </ul>
E	Module Definitions	Each APEX Firing System hardware Module that will be used to fire the show must be defined. <div data-bbox="440 1266 894 1421" style="text-align: center; margin: 10px 0;"> <p style="font-family: monospace; font-size: 1.2em;">module, 2, m144</p> </div>	<ul style="list-style-type: none"> <li>• Must begin with <b>module</b>,</li> <li>• Module Number must be a number from 1 to 128 and must correspond to the APEX hardware module number that will be used.</li> <li>• Each module number must be unique</li> <li>• Module Type must either be <b>M156</b>, <b>M144</b>, or <b>M32</b> and must correspond to the type of APEX hardware module being used.</li> <li>• There must be at least one module defined</li> </ul>

	Component	Description	Required Component Format <i>Note the comma following each component identifier ("REM," "music," "area," etc.)</i>
F	Show Cues	<p>The Show Cues are the instructions to the APEX Firing System of what to shoot and when to shoot it. The number of Show Cues that can be included in a .sho file is limited only by the available APEX hardware modules available (up to 128 modules). Two examples of the Show Cue structure are shown below.</p>  <p>Note: the first example above is a Show Cue for an M32 module. Since it does not use slat to address cues, the "slat" field is left blank. However the "slat" field must still be included (separated by a comma before and after the blank value).</p>	<ul style="list-style-type: none"> <li>Each of the following must have been previously defined in the .sho file. There is no other requirement on their use on individual Show cues. <ul style="list-style-type: none"> <li><b>Group</b></li> <li><b>Caliber</b></li> <li><b>Module</b></li> </ul> </li> <li>Slat value must be: <ul style="list-style-type: none"> <li>lower case</li> <li>"a" - "m" for Module Type M156</li> <li>"a" - "l" for Module Type M144</li> <li>blank for Module Type M32</li> </ul> </li> <li>Pin value is: <ul style="list-style-type: none"> <li>1 - 12 for Module Type M156</li> <li>1 - 12 for Module Type M144</li> <li>1 - 32 for Module Type M32</li> </ul> </li> <li>Fire Times must be of the format: HH:MM:SS:Frame where: <ul style="list-style-type: none"> <li>HH is two digit hour</li> <li>MM is two digit minute (00 - 59)</li> <li>SS is two digit second (00 - 59)</li> <li>Frame is two digit frame (00 - 29) where each frame is 1/30th of second long.</li> </ul> </li> <li>The Sequence of fire times must be in sequential order.</li> <li>Effect can consist of letters and numbers, and allows for a short notation of the effect being shot by this show cue. It is recommended that these be kept to less than 128 characters.</li> </ul> <p>Note: Typically, each Module-Slat-Pin address would be fired only once, and so would be unique throughout the entire firing sequence. However, there are some circumstances where repeat firing is desired. So cues are not required to be unique, but the system will display a warning upon loading a .sho file with repeat cues.</p>



.sho files produced for the predecessor firing system contain a "Comm Port" definition component. The APEX Firing System software is designed specifically for the APEX USB CIM, which utilizes USB connections instead of serial port connections. A Comm Port definition can be included in the .sho file, but will be ignored by the APEX Firing System Software.

**All predecessor firing system modules are fully compatible with the APEX Firing System.**

## 4.2 Fire Sequence Capabilities

The fire sequence is the sequence of Show Cues that are fired according to each Show Cue's defined Fire Time. The following describes the fire sequence capabilities of the APEX Firing System.

- A cluster of Show Cues can be fired at the same Fire Time, so long as:
  - all cues fired from an M144 are from the same slat letter
  - only one cue can be fired from an M156
  - **there are no more than 20 Total Show Cues in a cluster.**
- Firing times are only required to be separated by a single frame. This allows up to 30 fire events (single Show Cues or multiple Show Cue clusters) to be fired per second.

Example cluster of Show Cues. Firing from Module 1, Module 2, and Module 5 at the same Fire Time, 00:00:07:01

Example firing a series of cues from multiple modules, separated by a single frame.

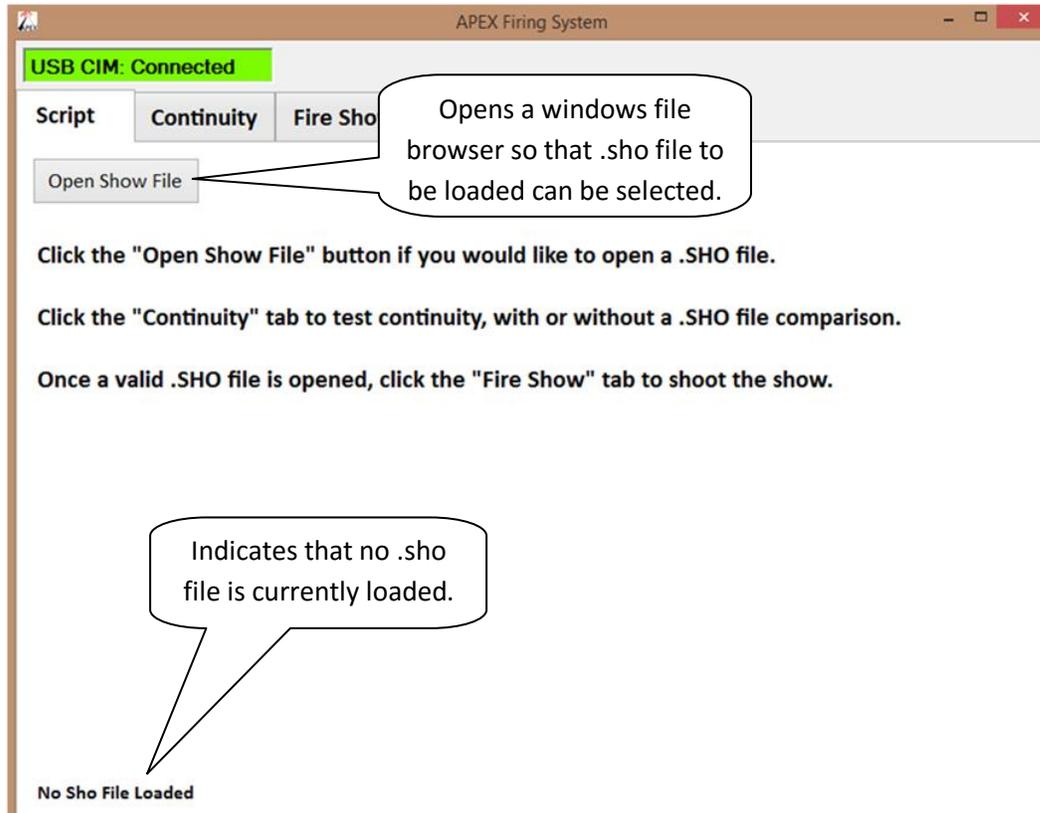
```
1,cake,1,,1,00:00:07:01,PFX13FR-6 White Strobe Mine|
2,3,2,a,1,00:00:07:01, 3" White Strobe Willow
3,6,5,a,1,00:00:07:01,6" Salute
4,6,5,d,9,00:00:07:02,6" Salute
2,6,2,a,2,00:00:08:28, 6" Colorful Falling Leaves w 5 times Thunder
2,6,2,d,10,00:00:08:29, 6" Blue Windbells
2,6,2,g,1,00:00:09:00, 6" Blue Windbells
3,3,5,a,2,00:00:15:10,3" Salute
3,3,5,a,3,00:00:15:11,3" Salute
3,3,5,d,10,00:00:15:12,3" Salute
4,3,5,d,11,00:00:15:13,3" Salute
4,6,5,a,4,00:00:15:14,6" Salute
4,6,5,d,12,00:00:15:15,6" Salute
```

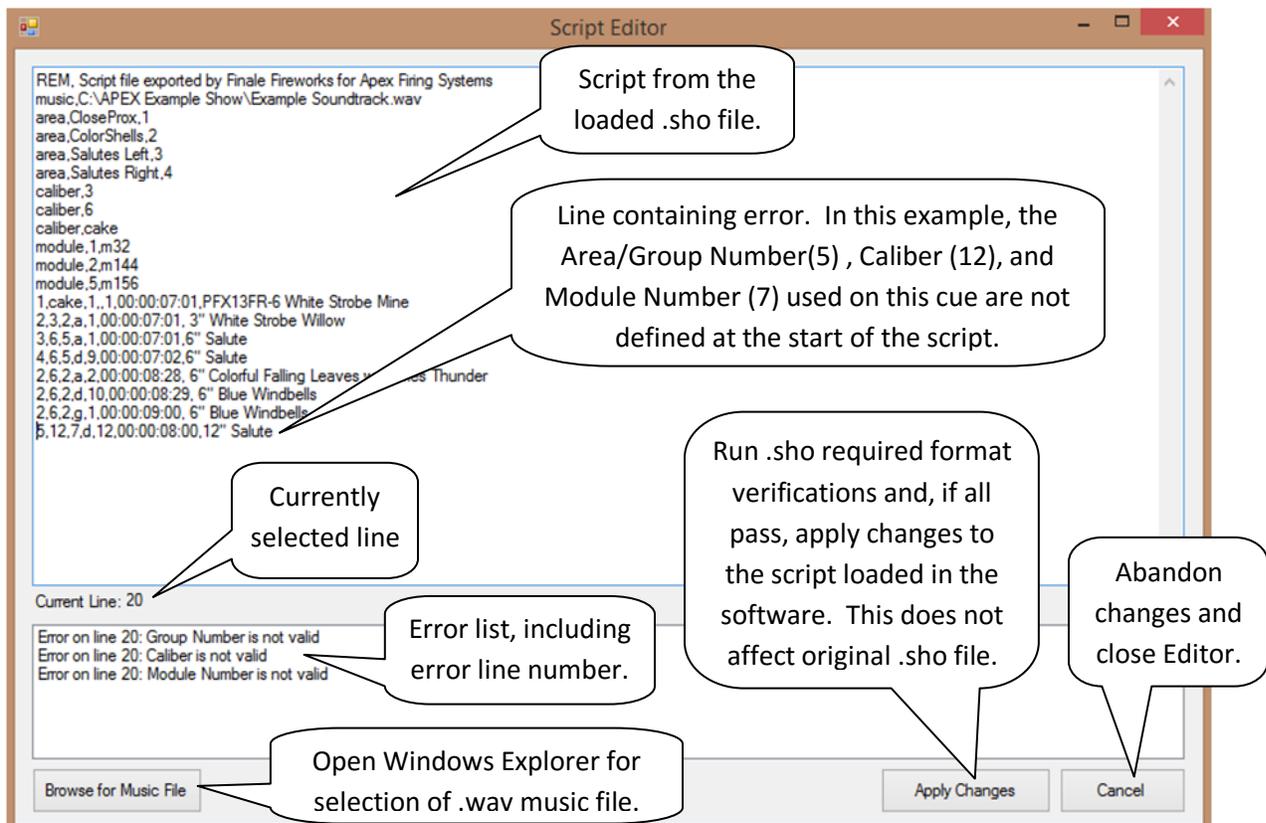
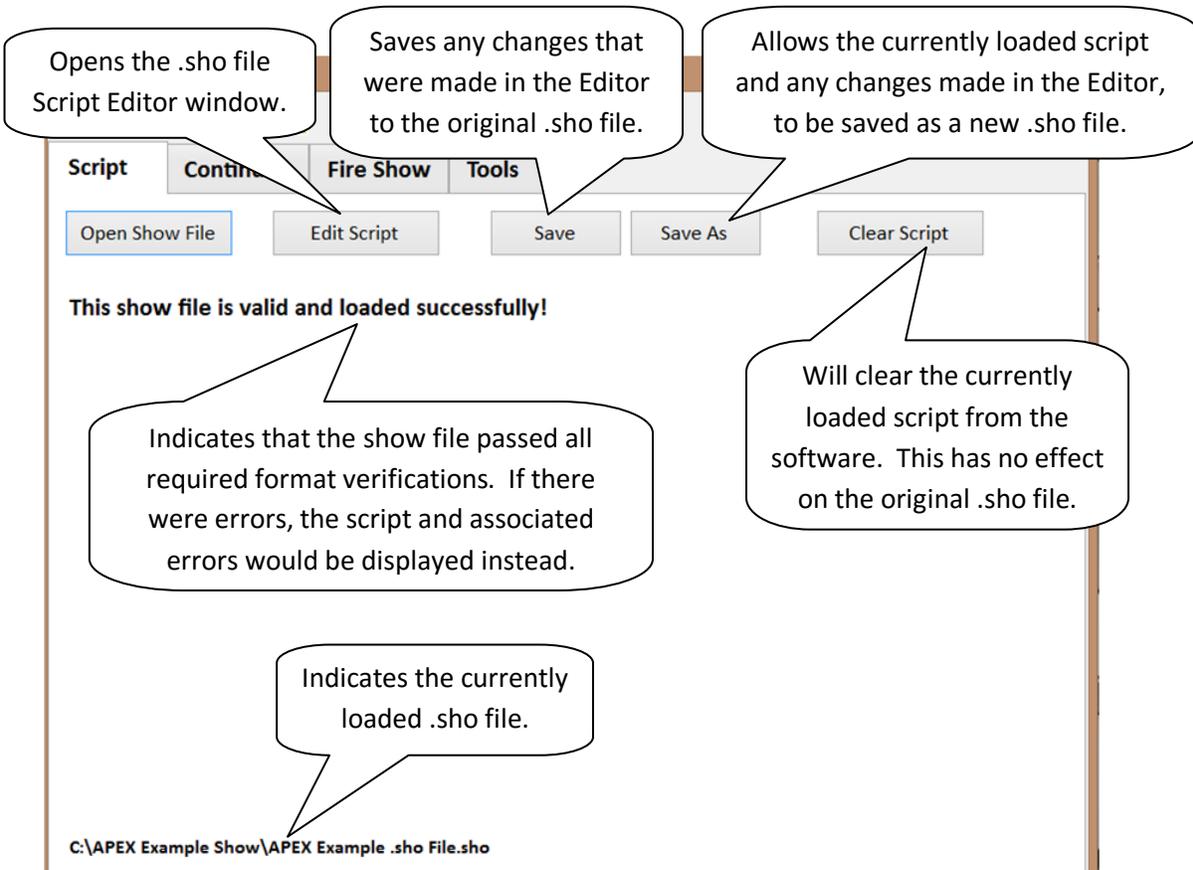
Example firing a single frame apart from multiple modules.

- Show Cues separated by a single frame can be fired from the same module.

### 4.3 Loading, Editing, and Saving .sho File

The screenshots below provides instructions and functionality details for opening, editing, and saving .sho files in the APEX Firing System software.



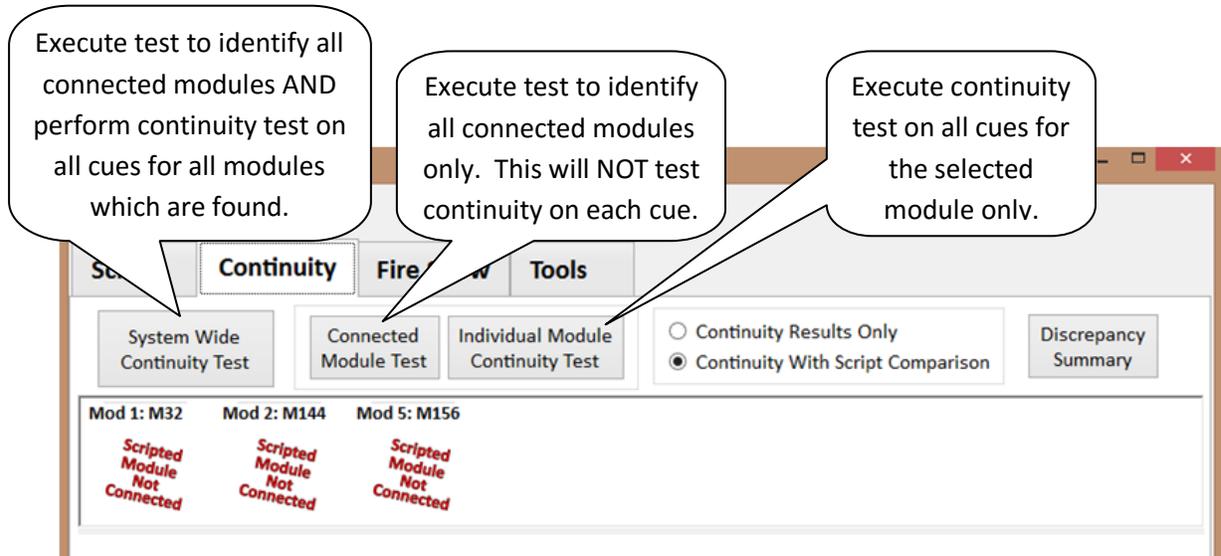


## 4.4 Continuity

Continuity provides the ability to test for connected APEX hardware, view the results of continuity tests, and compare continuity results to loaded .sho script to identify discrepancies.

### 4.4.1 Test Continuity

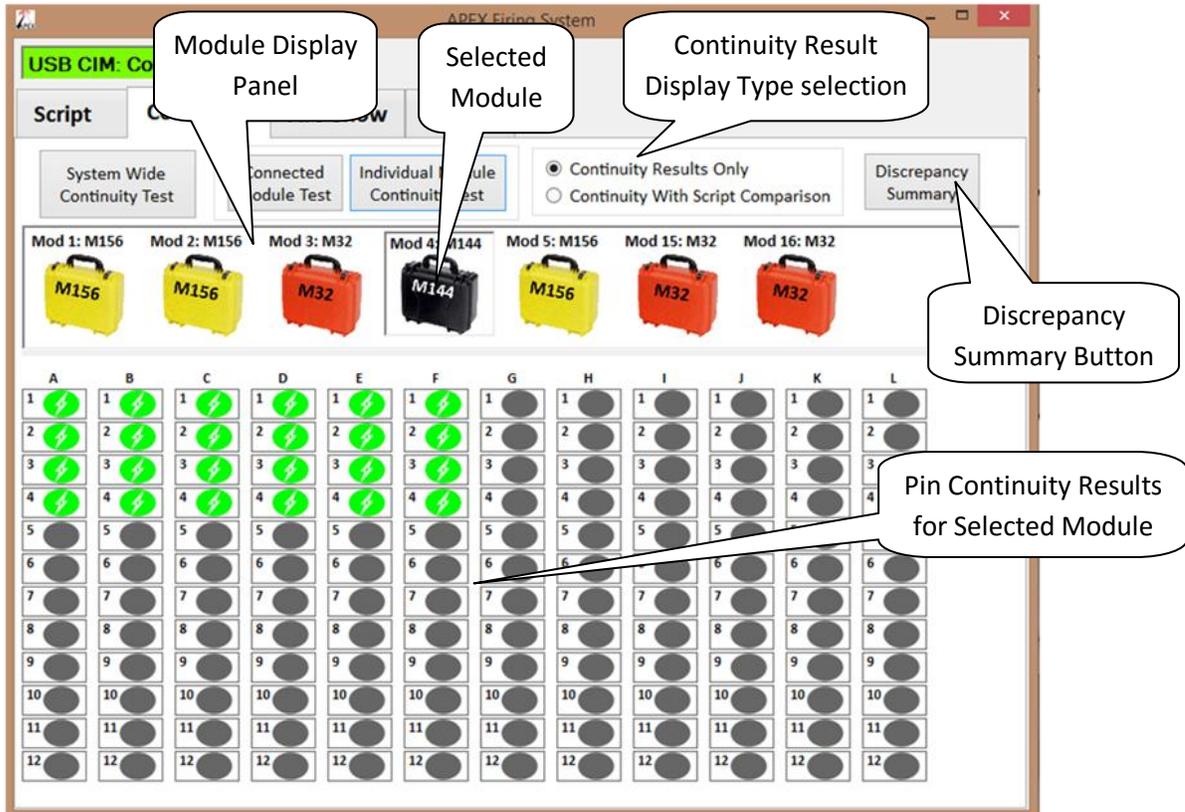
The APEX software provides three functions for testing the APEX hardware to identify modules and cues that are connected.



Note: If a .sho script has been loaded, the modules identified in the script will initially be displayed as "Scripted Module Not Connected". **You must perform either "System Wide Continuity Test" or "Connected Module Test" to identify connected modules before continuing to display results.**

### 4.4.2 View Continuity Test Results

The main components of the continuity results screen are shown in the screenshot below.

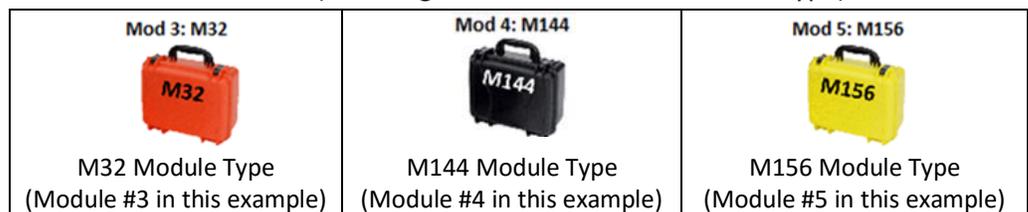


Continuity results can be displayed as "Continuity Results Only" or as "Continuity With Script Comparison". Each of these options is described in the sections below.

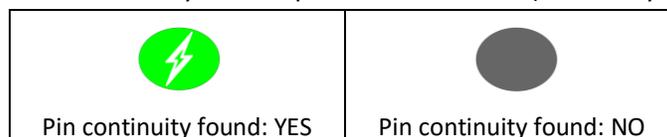
#### 4.4.2.1 Continuity Results Only

This display type will show only the results of APEX hardware test executions. That is, connected modules and pin continuity. A script is not required to be loaded since there is no script comparison. Display will consist of:

- Connected modules (including module number and module type)



- Continuity at each pin of each module (continuity found or not found)



### 4.4.2.2 Continuity With Script Comparison

This display type will show results of APEX hardware test executions as compared to the loaded .sho script. A.sho script is required to be loaded for this display type.

Display will consist of:

- Display connected modules along with comparison of expected module numbers and module types according to the loaded .sho script.

*\*In addition to the module icons from 4.4.2.1 above, these will also be shown when appropriate*

<p>Mod 4: ???</p> <p><b>Mod Type Inconsistent With Script</b></p> <p>Module type defined in .sho script does not match connected module type</p>	<p>Mod 6: M156</p> <p><b>Scripted Module Not Connected</b></p> <p>Module defined in .sho script is not connected.</p>	<p>Mod 4: M144</p>  <p>Module which is connected is not defined in the .sho script.</p>
--------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

- Display continuity at each pin of each module, along with a comparison to expected continuity at each pin according to the loaded .sho script.

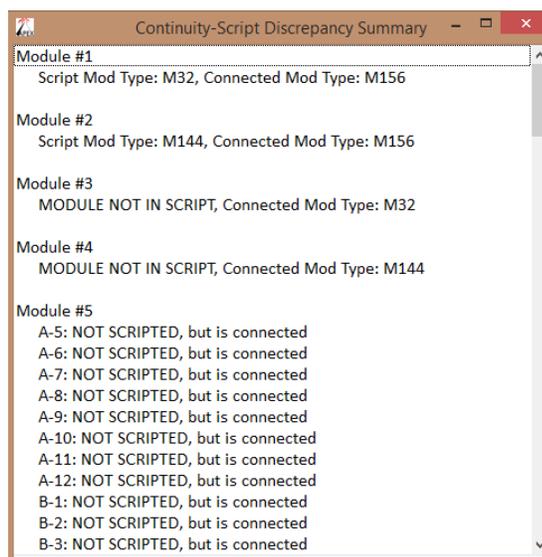
*\*Instead of the pin continuity icons in 4.4.2.1 above, these will be shown*

 <p>Consistent with Script, pin continuity: YES</p>	 <p>Consistent with Script, pin continuity: NO</p>	 <p>Not Consistent with Script, pin continuity: YES</p>	 <p>Not Consistent with Script, pin continuity: NO</p>
--------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------

## 4.4.1 Additional Continuity Results Features

### 4.4.1.1 Script Comparison Discrepancy Summary

The "Discrepancy Summary" button will display a list of all discrepancies between actual connected hardware/continuity and what is expected per the loaded .sho script.

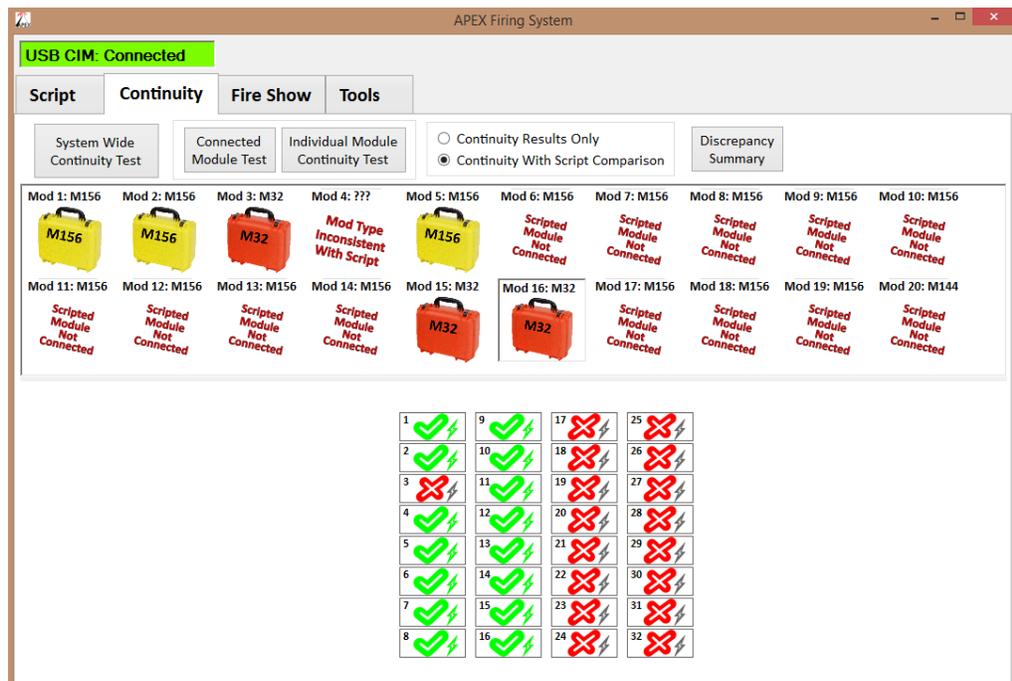


*Example Discrepancy Summary*

**4.4.1.2 Adjustable Screen Size**

While the APEX Software window size can be adjusted on any screen, it is particularly useful on the Continuity screen. Adjusting the screen size will adjust the size of the pin continuity icons relative to the Pin Continuity Results panel, making them easier to see and click.

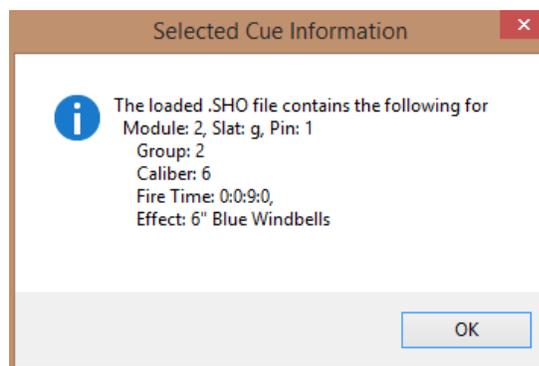
Adjusting the screen size will also provide additional space for module icons to be displayed in cases where a large number of modules are connected. The Module Panel size can also be increased by clicking/dragging the divider between the Module Panel and the Pin Continuity Results Panel. (Note: regardless of screen size, if there are more modules connected than can be displayed, the module panel will become scrollable).



Example "Continuity Results With Script Comparison", and adjusted Module Panel Size

**4.4.1.1 Selected Cue Information**

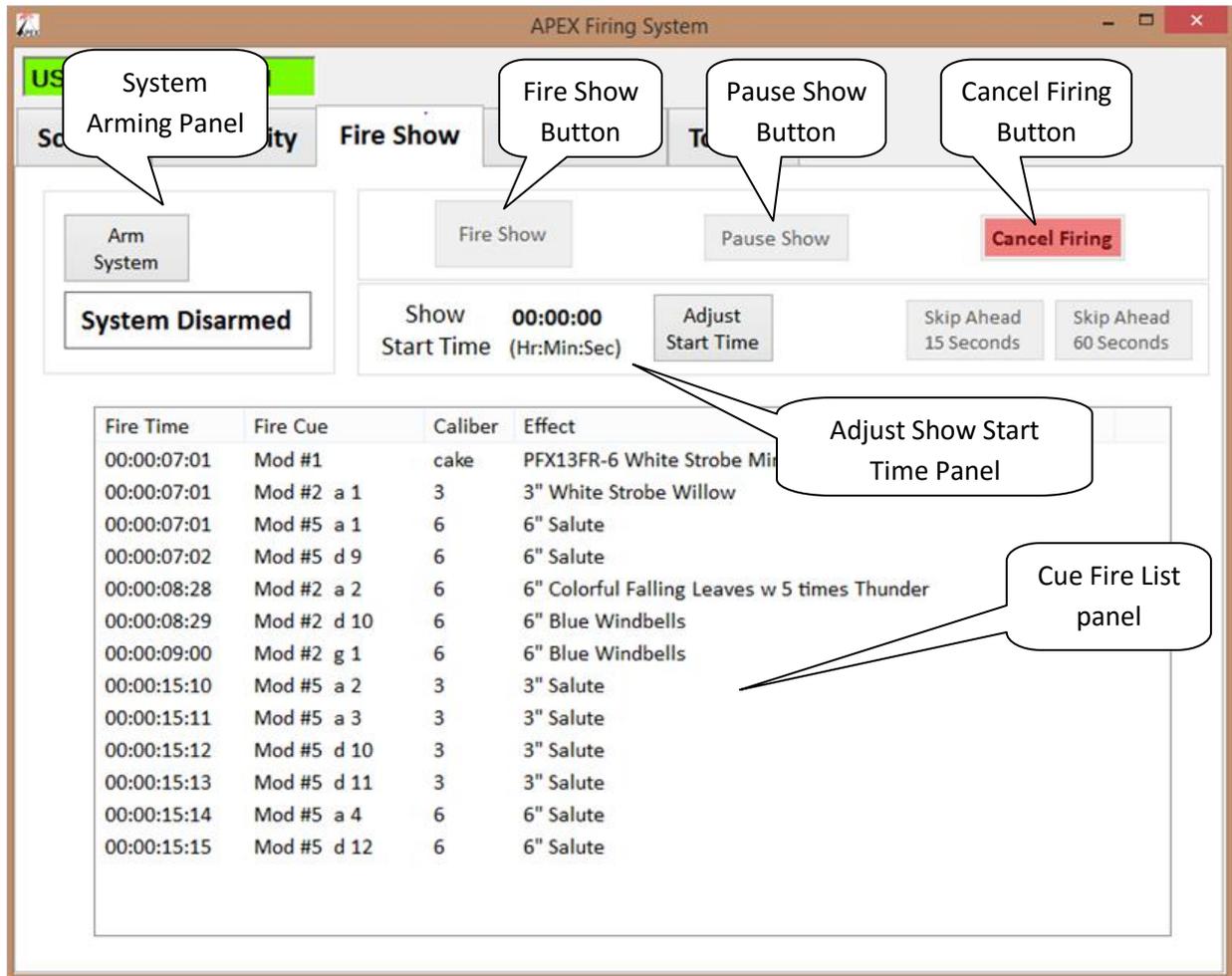
While displaying results as "Continuity With Script Comparison", clicking on an individual Pin Continuity result will display .sho script information for that individual cue.



Example "Selected Cue Information" window

### 4.5 Fire Show - Automated Show Firing

Once the .sho script has been created, loaded, and optional continuity tests have been performed as desired, the automated show can be fired. The screenshot below shows the main components of the Fire Show screen. And the sections that follow describe the typical sequence that will be performed on the "Fire Show" screen to fire the scripted pyrotechnic show.



### 4.5.1 Adjust Show Start Time

The "Adjust Show Start Time" panel displays the time at which the show will be started. The default is 00:00:00 (the beginning of the script). Clicking the "Adjust Start Time" button will allow the start time value to be adjusted, and will adjust the button to "Set Start Time". Once the start time is set to the desired value, clicking the "Set Start Time" button will save the value. During adjustment, a "Cancel" button will also be visible to allow canceling of the adjustment. Adjustment of the start time is optional.



*Adjust Start Time*



Note: While the show is firing, the "Show Start Time" will become a "Current Fire Time" clock.

Current	00:00:26
Fire Time	(Hr:Min:Sec)

During firing, the "Skip Ahead 15 Seconds" and "Skip Ahead 60 Seconds" buttons can be used to advance the show music and cue firing by 15 seconds and 60 seconds respectively. Cues that are scripted to fire during the skipped time are not fired.

### 4.5.2 Arm System

Before firing the show, the APEX system must first be armed. Clicking the "Arm System" button will initiate the arming sequence. The "ARM" key on the APEX USB CIM must be set to "ON" before the system can be armed. A message will be displayed as a reminder to set the key to the correct position.

Once the system is armed, the "Disarm System" button is used in a similar way to disarm the system. Prior to disarming, the APEX USB CIM "ARM" key must be set to "OFF".

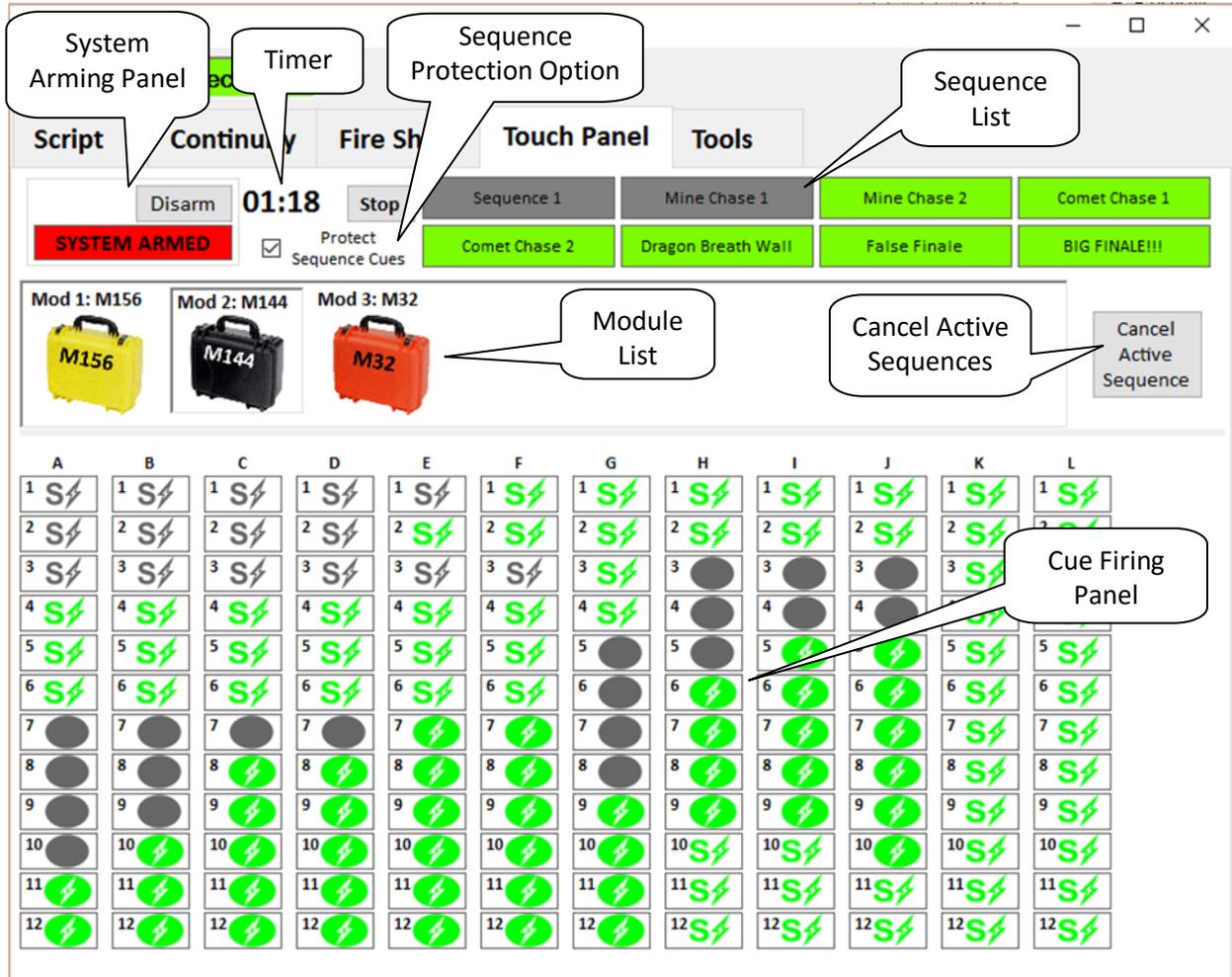
### 4.5.3 Fire Show

To initiate the show firing, click the "Fire Show" button. This will open a final confirmation message. Clicking "Yes" will then start the music and begin firing cues according to the .sho script firing sequence. The Cue Fire List Panel displays a full scrollable list of cues ordered by fire time. During firing, the next cue to be fired will be highlighted yellow. As cues are fired, they will be highlighted red briefly. The list will auto-scroll to keep upcoming cues in view during firing.

While show firing is in progress, the "Pause Show" and "Cancel Show" buttons will be enabled. Clicking "Pause Show" will pause the music and firing sequence, but will hold the current fire time. The "Resume Firing" button will then be displayed to allow firing to continue from that fire time. Clicking the "Cancel Show" button during firing will immediately pause the show as described above, and then display a confirmation to allow show firing to be cancelled. Once cancelled, show firing cannot be resumed.

## 5 Touch Panel - Manual Show Firing

The Touch Panel screen allows individual cues to be fired manually. A screenshot of the touch panel and a description of the Touch Panel components and functionality is below.



Before any cues can be fired from the Touch Panel, it must first be armed. The System Arming Panel provides a button to Arm and Disarm the Touch Panel system. A status indicator in the panel also gives the current armed status.

Once Armed, individual cues can be fired by first selecting the associated module from the Module List, and then clicking on the cue to be fired in the Cue Firing Panel. Modules displayed are those that have been identified as connected in the most recent continuity test and those which are used in one or more sequences. The cue is fired immediately after being clicked in the Cue Firing Panel. Cue icons are updated as fired to indicate the appropriate continuity status.

The APEX firing system provides the ability to build and fire sequences of cues. This can be useful for planned sequences of effects (mine chases, comet chases, etc.), for periods where the desired firing rate is faster than can be achieved by clicking, or for periods of consistently paced firings. The "Cancel Active Sequence" button will halt firing of all Sequences which are actively firing. Re-firing of sequences which were cancelled will resume firing from the point the sequence was cancelled. The software provides for a maximum of 99 sequences, with a limit of 300 total events (total cue fire events and delay events) per sequence. See section **6.1.3 Sequence Builder** for details on sequence creation.



The system is designed to allow multiple sequences and manual firing to occur simultaneously. In cases where the combined firing rate of all sequences and manual firing exceeds the limit of the system (30 per second), priority is given first to manual fire, then to the order of the sequences based on Sequence Number (Sequence 1 highest priority, Sequence 99 lowest).

Sequence 1	Sequence 4	Sequence 7	Sequence 10
Sequence 2	Sequence 5	Sequence 8	Sequence 11
Sequence 3	Sequence 6	Sequence 9	Sequence 12

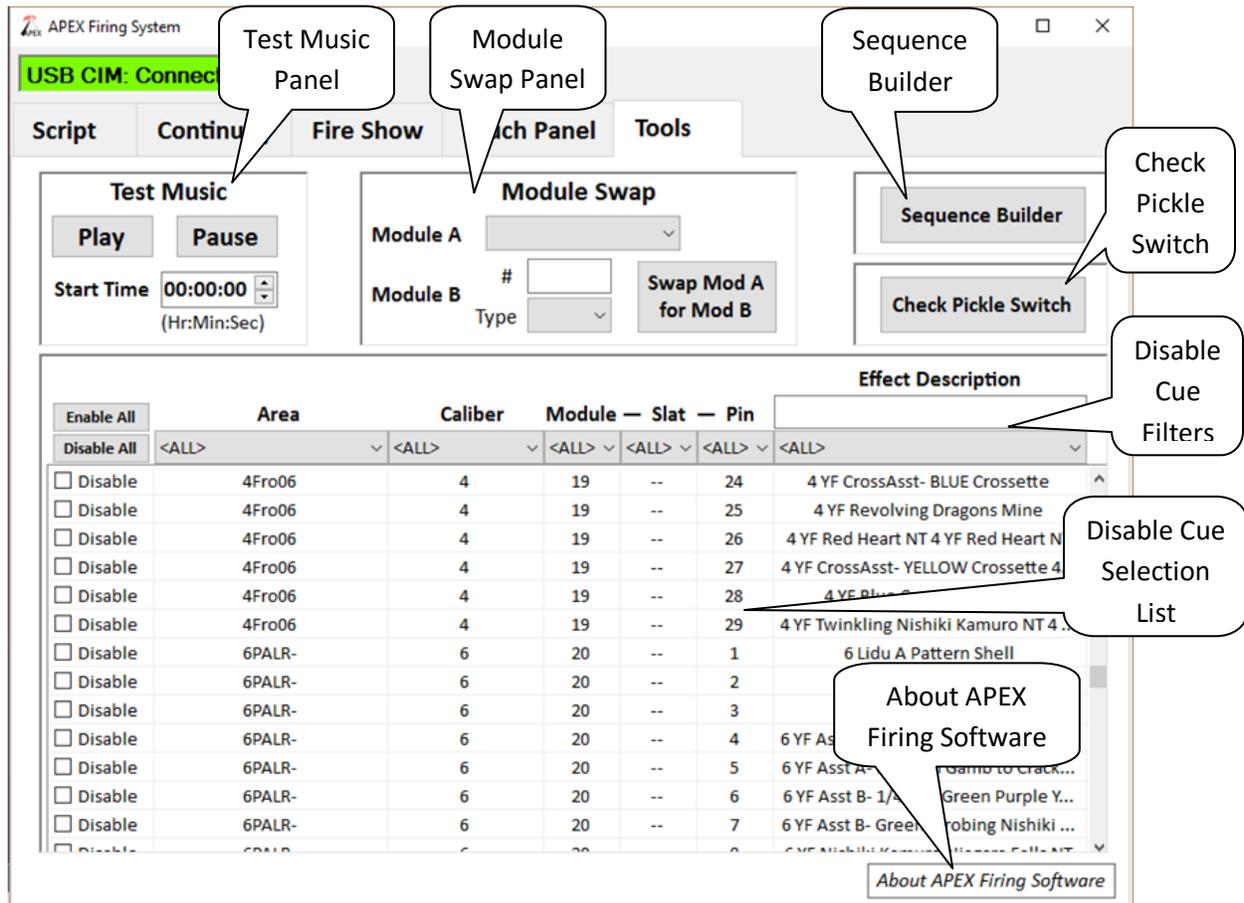
The Protect Sequence Cues option, when selected, will prevent manual firing of cues from the Firing Panel if they are used in a Sequence. This protects cues intended to be fired as part of a sequence from accidentally being manually fired. This box can be unchecked at any time to remove this protection so that sequence cues can be fired from the Cue Firing Panel.



The system allows navigation to other Tabs while the Touch Panel is Armed. However, firing of any active sequences will be paused when navigating away from the Touch Panel Tab. Any sequences that were paused will resume once the Touch Panel is displayed again.

## 6 Tools

The "Tools" tab provides several features that may be useful during show prep. The screenshot below identifies these tools, and each is described in detail in the sections that follow.



### 6.1.1 Test Music

The "Test Music" can be used for a sound check prior to the start of a pyromusical. The start time can be adjusted so that any portion of the soundtrack can be played as the sound test.

### 6.1.2 Module Swap

The "Module Swap" tool allows for easily changing a scripted module for a backup module of a different module number, and in some cases different module type. The common scenarios for use of this tool would be replacement of a damaged module with a backup, or the quick correction of script which utilizes the wrong module number for the actual available equipment.

Module swaps performed with this tool will be made throughout the entire script within the APEX Software only. That is, the change will be reflected throughout the Continuity tab and throughout the Cue Fire List on the "Fire Show" tab, but will not be reflected on the "Script Editor" window, and cannot be saved to a .sho file.

To perform a module swap:

1. **Module A:** Select the scripted module that will be replaced from the auto-populated list.
2. **Module B #:** Enter the module number that will take the place of Module A.
3. **Module B Type:** Select the module type of the module that will take the place of Module A.

Note - the tool will enforce the following rules regarding module swaps:

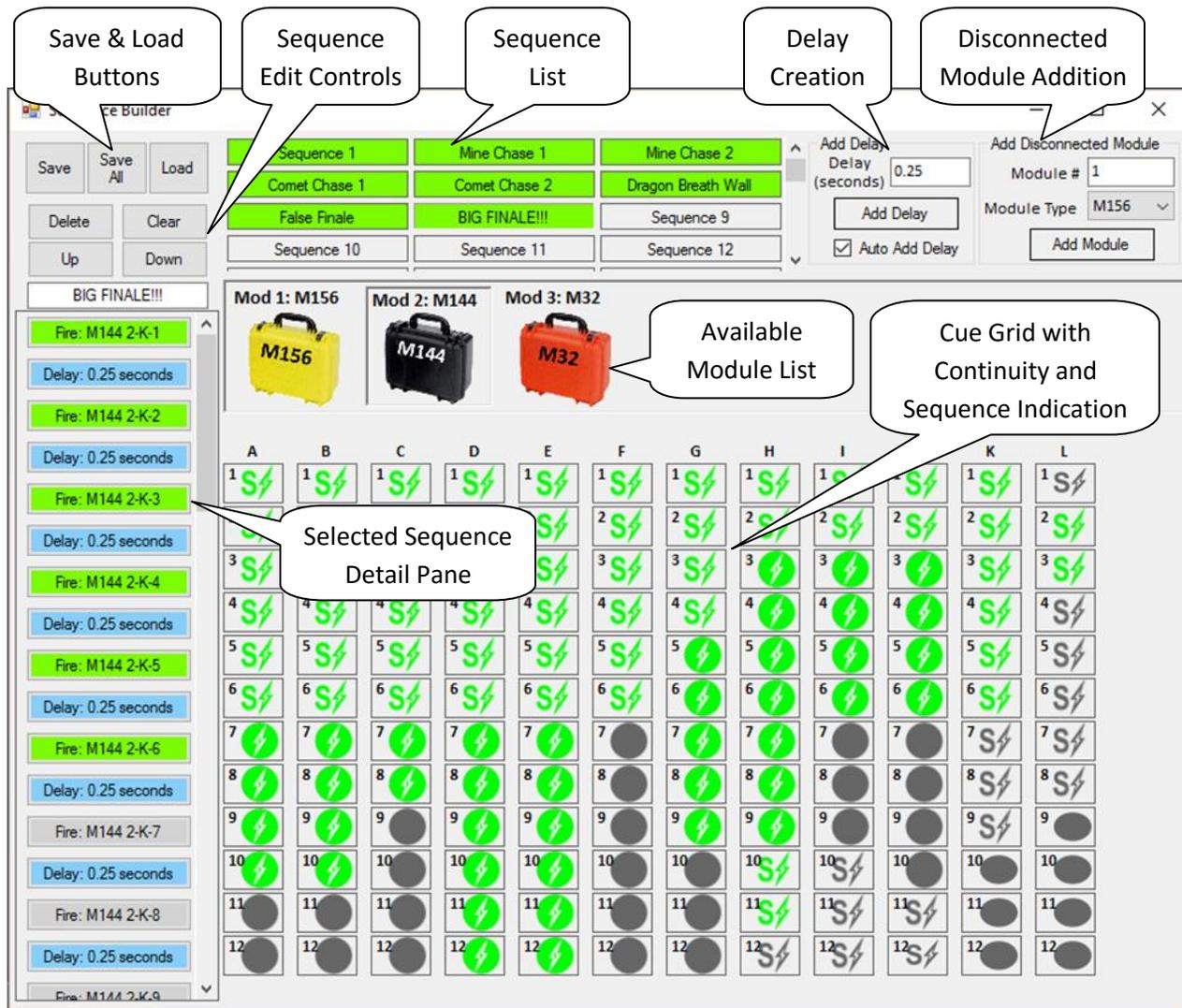
- Module B must not be used in the .sho script
- An M32 module type cannot be swapped for an M144 or M156 module type, and vice versa
- If the scripted module (Module A) is an M156, and is being replaced by an M144 module, any M-slat cues that are scripted will be ignored since the M144 does not have an M-slat. Although not ideal, this may be preferred over the loss of all cues scripted for the M156.
- Scripted module type of M144 can be replaced by an M156 module type (since M-slat would not be scripted, there is no conflict)



The Module Swap tool can be used to change a module's type (according to the module type rules detailed above) by simply entering the module number for **Module A** as the value for **Module B #** and selecting the new type.

### 6.1.3 Sequence Builder

The Sequence Builder button launches the Sequence Builder window. Sequences are used in the Touch Panel. See section 5 **Touch Panel - Manual Show Firing** for a description of Sequences and their use. The functions available for creating custom sequences within the Sequence Builder tool are shown in the screenshot below, and described in the following sub-sections.



#### 6.1.3.1 Sequence Selection

Clicking the sequence name from the list of sequences will display the details of that sequence in the Sequence Detail Pane and allow editing of that Sequence.

#### 6.1.3.2 Sequence Creation & Editing

In order to add cues to a firing sequence, the associated module must first be selected in the Module List. The module list is populated from the most recent Continuity Test performed. See section 4.4 **Continuity** for details on performing Continuity Test. If a module that you would like to use for sequence building is not yet connected, it can be manually added with the Disconnected Module Addition pane.

Selecting the Module in the Module List will then display all cues (pins) for that module. The meaning of the icons displayed are described below.

			
Used in a Sequence: NO	Used in a Sequence: NO	Used in a Sequence: YES	Used in a Sequence: YES
Pin continuity: NO	Pin continuity: YES	Pin continuity: NO	Pin continuity: YES

Clicking on a pin will add a new Fire Event at the end of the selected sequence in the Sequence Detail pane for the cue associated with the clicked pin. For M144 and M156 modules, clicking the slat letter will add all pins for that slat to the selected Sequence.

Delays can be added to the selected sequence by entering a delay time in the Delay Creation pane and then clicking the Add Delay button. A Delay Event will be added at the end of the selected sequence in the Sequence Detail pane. Checking the "Auto Add Delay" box will automatically add the Delay Event after each Fire Event is added. To edit a delay time within a sequence, first select the Delay Event, then click a 2nd time.

Individual events (Fire Events or Delay Events) within the selected sequence can be moved up or down in the sequence, or deleted from the sequence, by first clicking the Event, then clicking the associated button. Additionally, keyboard "up" and "down" arrow keys can be used to quickly navigate the selected event, while the keyboard "Page Up" and "Page Down" keys will move the selected Event up or down within the sequence. The Keyboard "Delete" key can be used to delete the selected event from the sequence. Clicking the Clear button will clear the entire sequence.

Events are color coded as follows:

- Grey - Fire Event for a pin with no continuity results, or which last continuity indicated disconnected.
- Green - Fire Event for a pin which last continuity indicated connected
- Blue - Delay Event

The sequence names can be edited at the top of the Selected Sequence Detail Pane.

### **6.1.3.3 Description of Event Firing**

When a sequence is fired, its fire events are processed in the order they appear in the Sequence Detail Pane, starting from the top to the bottom. Subsequent Fire Events are fired by the system one per frame apart (approximately one every 33ms, or 30 per second). This rapid subsequent firing of Fire Events continues until a Delay Event is reached. Firing of that sequence will be suspended for the duration of the delay. Once the delay is past, firing will resume in the same manner until all Fire Events have been processed.

#### 6.1.3.4 Save & Load Buttons

Individual sequences that have been built can be saved by first selecting the sequence, then clicking the "Save" button. This will save only the selected sequence. Clicking the "Save All" button will save all sequences into a single file.

To open a sequence or sequences from a saved sequence file, first select a sequence, then click the "Load" button. Select the sequence file that is to be loaded. If the save file contains a single sequence, only the selected sequence will be overwritten. If the save file contains multiple sequences, all current sequences will be overwritten.

#### 6.1.4 Check Pickle Switch

In order for the system to fire the show, the pickle switch must be connected and must remain connected throughout show firing. The "Check Pickle Switch" Button can be used to verify pickle switch hardware is functioning as expected prior to Show Firing. Clicking the button will initiate a check of the pickle switch hardware, and a message will be displayed to indicate whether it is connected or not.

#### 6.1.5 Disable Cue

If a valid SHO file is loaded, individual or groups of cues can be disabled using the Disable Cue List. The filter selections at the top of the list can be used to filter the displayed cues by Area, Caliber, Module, Slat, Pin, or Effect Description. Once the filter criteria have been set to narrow the results as desired, individual cues can be disabled by clicking the checkbox on the left side of the cue row. The Enable All and Disable All buttons can be used to Enable or Disable all of the cues displayed in the result list.

Cues which have been disabled will be displayed as "DISABLED" in the Cue Fire List on the Fire Show tab and will not be fired during Show Firing.



Disabled Cues are disabled **only in the Fire Show - Automated Firing**. They can still be fired from the Touch Panel - Manual Firing screen.

#### 6.1.6 About APEX Firing Software

Clicking the "About APEX Firing Software" link will display basic software release info, including software version.