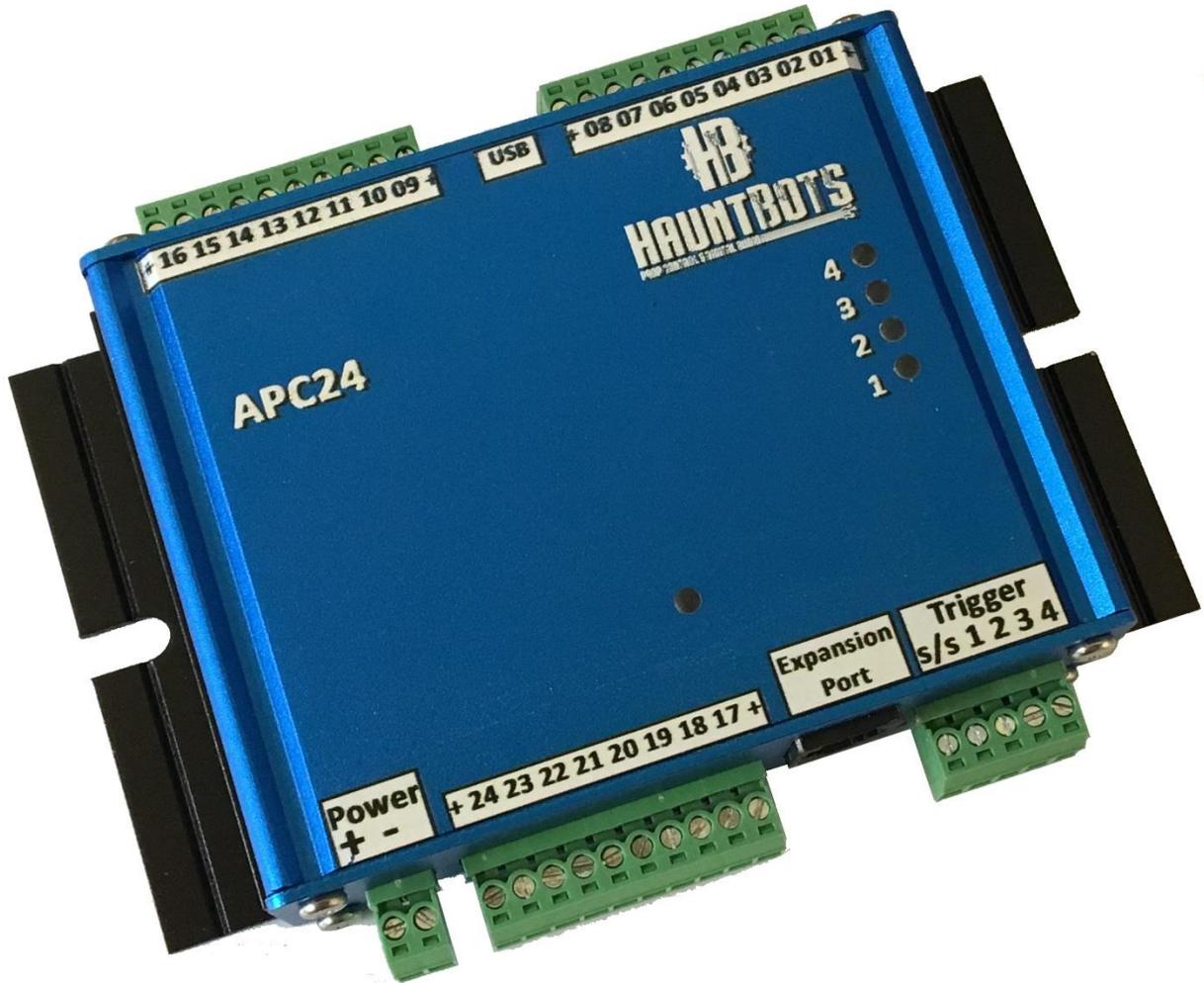


# Technical Manual

## APC24



**By HauntBots llc**

**Rev2 controllers**  
Covers D5 Firmware

Date: 03-13-2018  
Revision: 4.0.0

## Table of Contents

NOTICE .....	2
1. Introduction .....	3
1.1. System Overview .....	3
1.2. Document Overview .....	3
2. System Description .....	3
2.1. Specifications .....	3
2.2. Applications .....	3
3. Hardware .....	4
3.1. Power Supply .....	4
3.2. Inputs .....	4
3.3. Outputs .....	5
3.4. Programming Port .....	5
3.5. Expansion Port .....	5
Programming Console Software.....	6
3.6. Installation: .....	6
3.7. USB Driver Installation .....	6
3.8. Show Creation Modes: .....	11
3.9. Setup .....	11
3.10. Connection:.....	12
3.11. Console Header .....	13
3.12. Show Options:.....	13
3.13. APC24+ Options: .....	14
3.14. Advanced Options.....	16
3.15. Output Channels .....	17
3.16. Show Control .....	18
3.17. New Show:.....	19
3.18. Open and Save Show: .....	20
3.19. Upload and Download Show: .....	20
3.20. Erase Show and Erase All: .....	20
3.21. Sample Recording Session:.....	21
3.22. Graphical Editor .....	23
3.23. PluginFx .....	25
3.24. Firmware Update .....	27

## NOTICE

**It is the user's responsibility to determine the suitability of this product for any given application. This device is not intended for use in any life-critical system. An understanding of electronic terminology and practices are required to use this device. The unit must be mounted in a way that prevents exposure to moisture and within the parameters of any applicable codes.**

# 1. Introduction

## 1.1. System Overview

The APC24-Plus is a stand-alone controller for multi-motion animatronic props or animated scenes.

The 24 digital (on-off) outputs can be programmed with a computer running the provided HauntBots Programming Console software. The Programming Console allows you to create shows either in real time or graphically. The controller can store multiple shows of varying length and frame rate.

Two additional outputs (reed relay - dry contacts) can be used for starting / stopping other show elements such as external sound sources.

Four optically isolated inputs are provided for starting / stopping the desired show.

Numerous options are available to match your application. The various options are configured through software.

The controller has a sturdy aluminium case with mounting flanged.

## 1.2. Document Overview

The following conventions will be used throughout this manual

Acronym	Meaning
RTP	Real Time Programming (or recording)
APC	Generic term referring to any HauntBots controller

Ground, negative, or (-) may be used interchangeably when referring to the power supply connections.

The terms "Recording" or "Programming" may be used interchangeably when referring to the real time show creation process.

# 2. System Description

## 2.1. Specifications

- 24 digital outputs - 500 ma per bank of eight
- 2 reed relay contact outputs
- 4 optically isolated inputs – 5 to 24 volt trigger signal
- Maximum show length of over 32,000 frames
- Power supply – Low current draw from 9 to 24 volt DC power supply

## 2.2. Applications

Intended for stand alone operation of animatronic characters or multi prop/effect control in animated scenes.

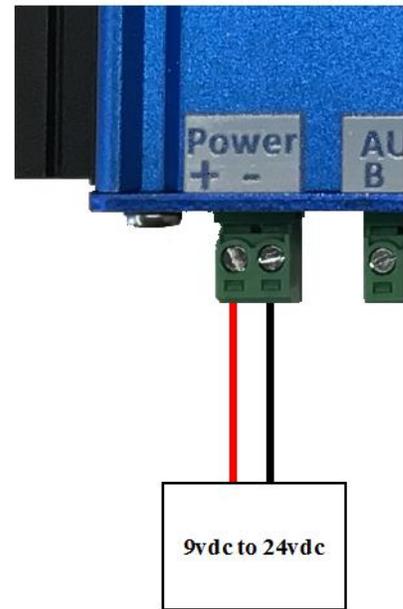
### 3. Hardware

#### 3.1. Power Supply

The APC is designed to operate on 9 to 24 volts DC. Power should be applied to the **Power** connector observing the polarity on the label.

Typically, you would power the APC with the same voltage required by the items you are connecting to the outputs. If you are using 24 volt valves, then supply 24 volts to the APC, If you are using 12 volt relays, then use 12 volts, etc.

The on-board voltage regulator is short circuit protected, and there is a solid-state (Ptc) fuse on the DC input. The DC input should be externally fused based on the amount of current that you expect to be drawing from the various outputs.



#### 3.2. Inputs

The APC has four optically isolated trigger inputs. Inputs 1 & 2 can be configured as:

- Single Show: [Start] / [Stop]
- Dual Show: [Start Show 1] / [Start Show 2].
- Multi Show: [Next] / [Previous]

When in Quad show mode, the inputs are Start Show 1, Start Show 2, Start Show 3, Start Show 4

These inputs will work down to approximately 5 volts DC and voltage polarity is not important.

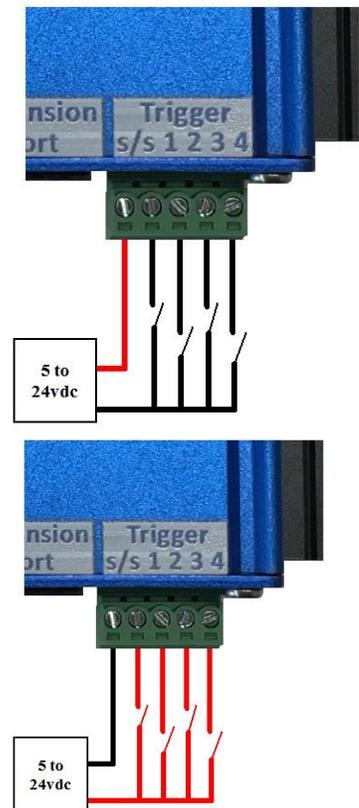
You must supply voltage to an input terminal in order to trigger the input.

The s/s terminal connection determines whether the inputs are expecting sinking or sourcing trigger devices.

If optical isolation is not required, the trigger voltage can be obtained from the power terminals on the APC.

**Note:** Inputs are ignored when the programming console is running

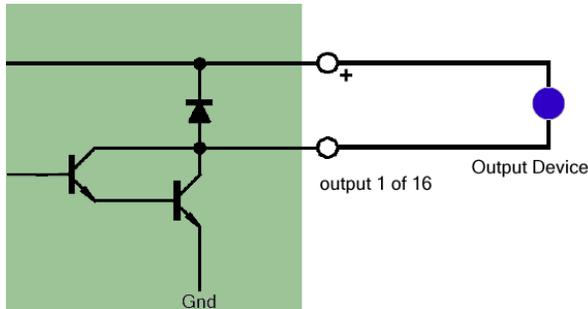
Using the Setup / Advanced Options in the programming console, you can choose whether these trigger inputs are expecting a normally open, or normally closed switch input.



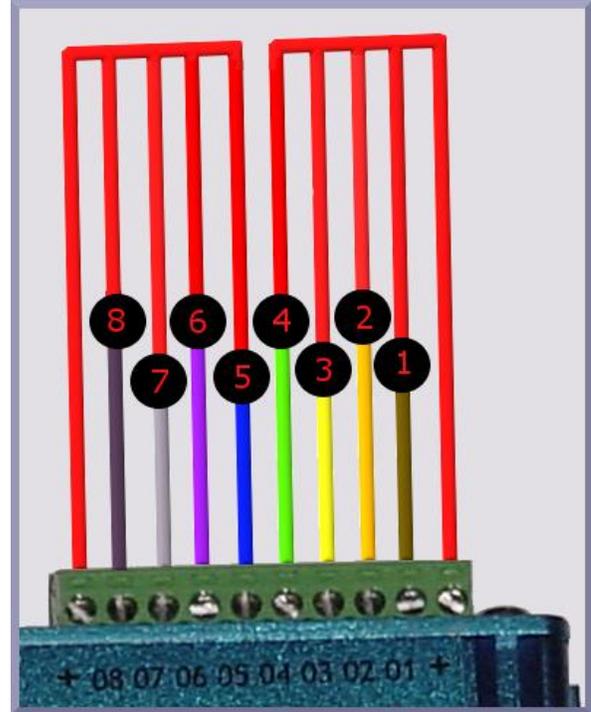
### 3.3. Outputs

#### 3.3.1. Bank 1, Bank 2, Bank 3

The 24 outputs are arranged in two banks of eight. Each bank is driven by a ULN2803 chip in a socket for easy replacement. The ULN2803 is rated at 500 ma max. This rating is the maximum per bank and must be considered when estimating the number of outputs you expect to activate simultaneously, their duty cycle and the ambient temperature. 125 ma per output is typically a safe value for the duty cycle experienced in most animatronic applications.



Each bank includes two + terminals that you can use as a voltage source for the devices you are connecting. These carry the same voltage found at the + Power terminal.



### 3.4. Programming Port

The programming port is a standard USB connection. When connected to the host computer, the Programming Console software will attempt to make a connection with the APC.

### 3.5. Expansion Port

An RJ12 phone style jack is provided for future product expansion and accessory control.

# Programming Console Software

## 3.6. Installation:

Download the latest version from the “Support” tab on the APC24 product page  
[http://www.hauntbots.com/index.php?main\\_page=product\\_info&cPath=65&products\\_id=180](http://www.hauntbots.com/index.php?main_page=product_info&cPath=65&products_id=180)

Unzip and Run setup.exe to install.

**Note:** Before installing new software, you should check the release notes, if any, for additional, version specific instructions.

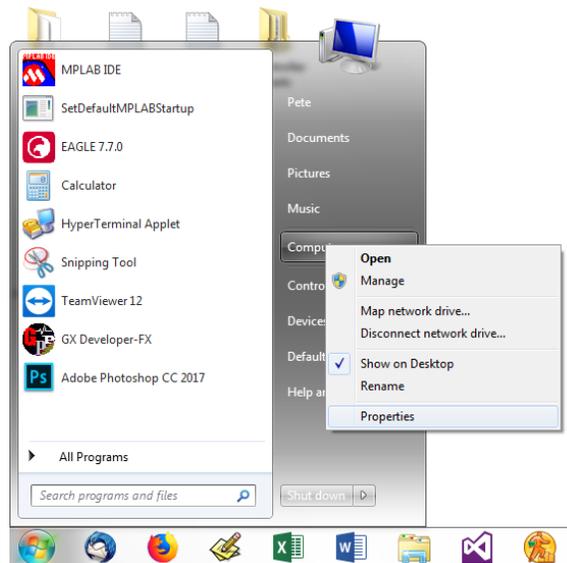
## 3.7. USB Driver Installation

Connect the APC24 to your computer with a USB cable. If there is an available internet connection, the computer will connect to Windows Update and install a suitable driver.

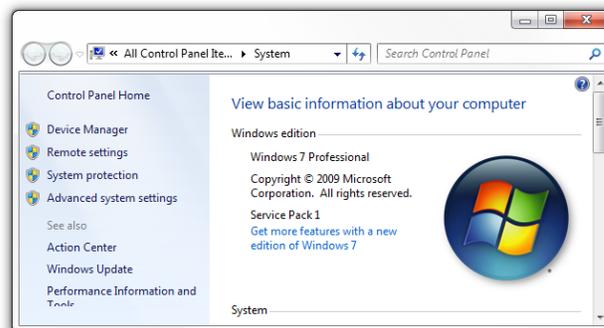
**If the automatic update takes place there is no need to continue with the procedure outlined below.**

If no suitable driver is automatically found then the following procedure should be followed.

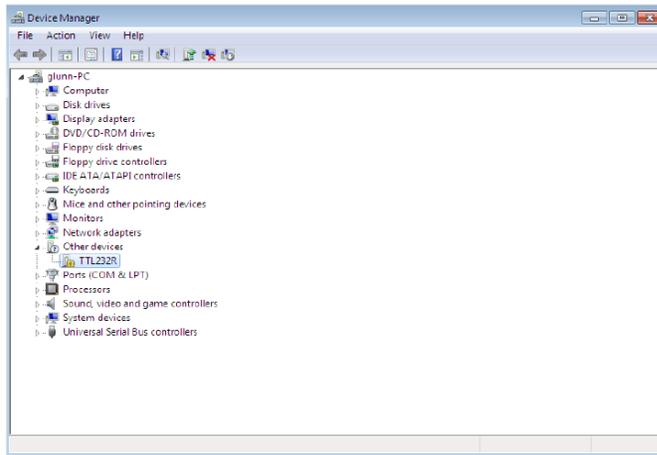
- 1) Download the latest driver from the “Support” tab on the APC24 product page. Unzip the files to an easily remembered spot on your computer.
- 2) Press the Windows start button to bring up the start menu and right click on “**Computer**”. Choose **Properties** from the popup menu.



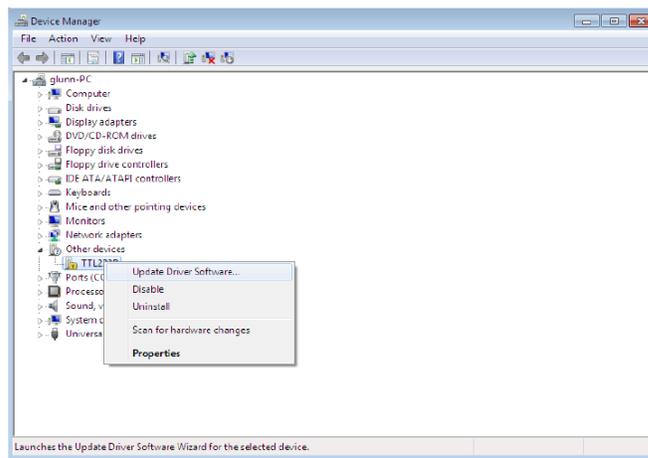
- 3) Click on Device Manager in the left-hand column.



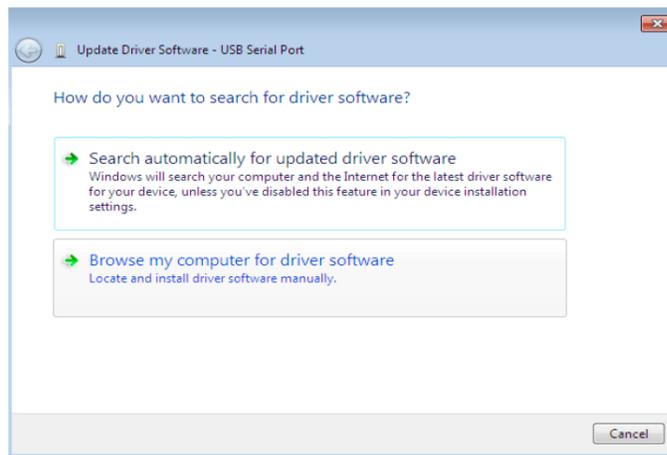
- 4) In the Device Manager window there will be a device under **Other Devices** with a yellow warning symbol to indicate a problem i.e. no driver installed. The text next to this device will depend on the device attached.



- 5) Right click on the other device (TTL232R in this example) to bring up a menu as shown below.



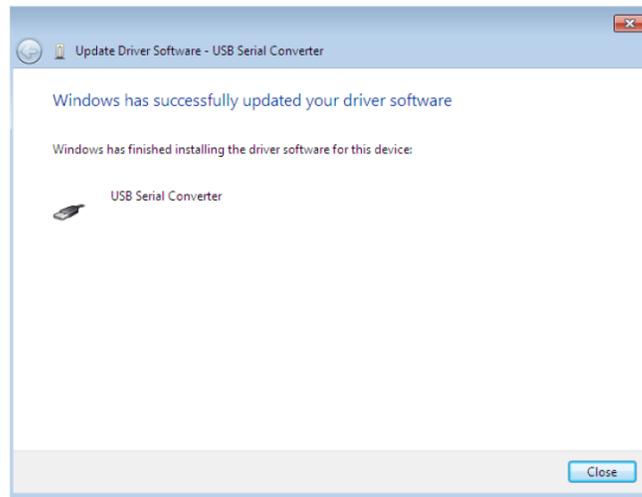
- 6) From the displayed menu select "Update Driver Software..." This then displays the option for an automatic search or a manual search. Select the second option to browse manually.



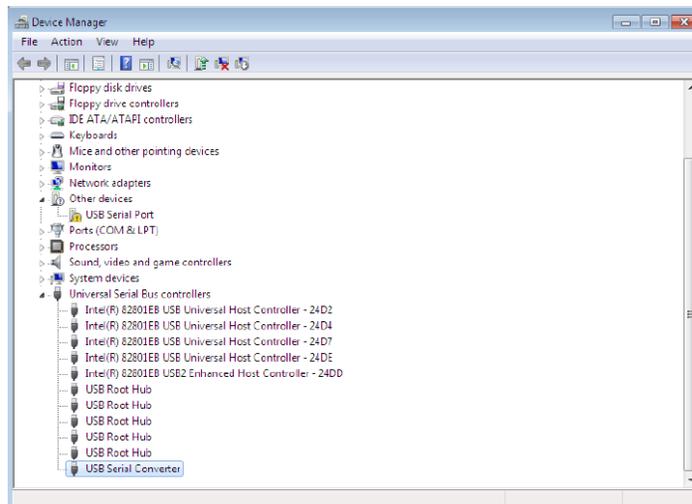
- 7) Click the **Browse** button and select the folder where you stored the driver previously downloaded. After selecting the file location, press **Next** to start the installation.



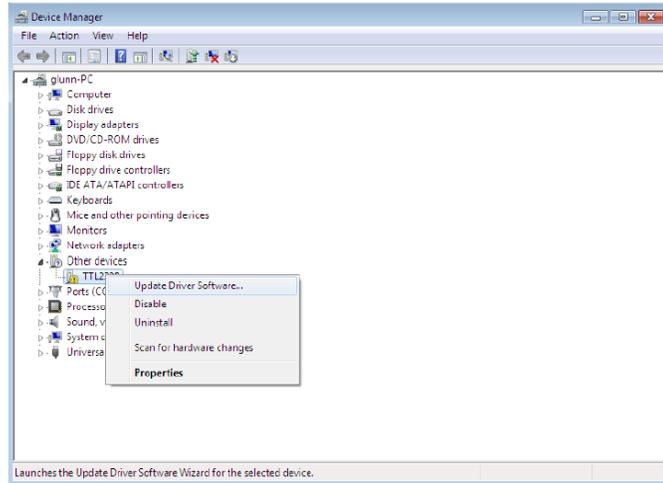
- 8) When the installation has finished, a completion screen is displayed. Press **Close** to close this window and go back to the Device Manager Window.



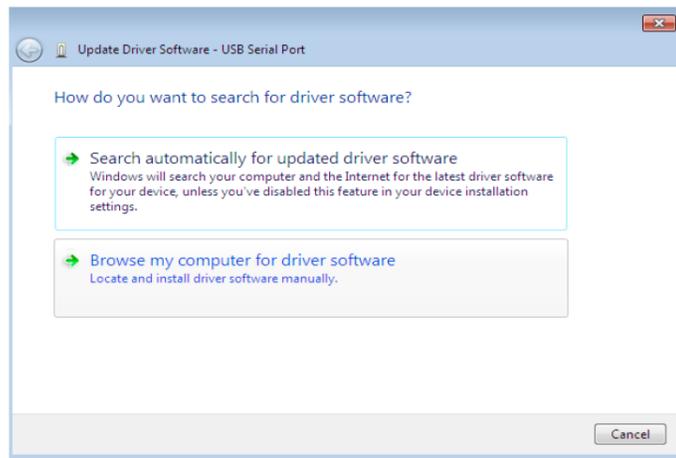
The Device Manager will still show a device under Other Devices but in addition to this there is a new entry under Universal Serial Bus Controllers indicated in the screenshot below as the USB Serial Converter. This indicates the bus layer of the driver is installed. Installing the Virtual Com Port layer of the driver is almost a repeat of the last few steps.



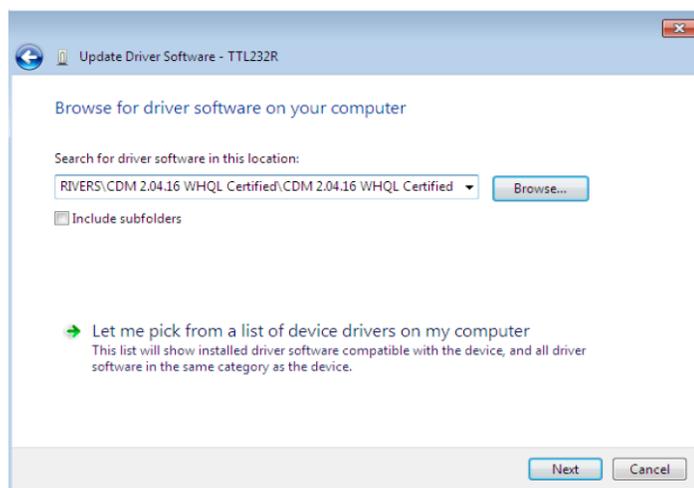
- 9) Right click on the other device (TTL232R in this example) to bring up a menu as shown below. From the displayed menu select **Update Driver Software...** This then displays the option for an automatic search or a manual search.

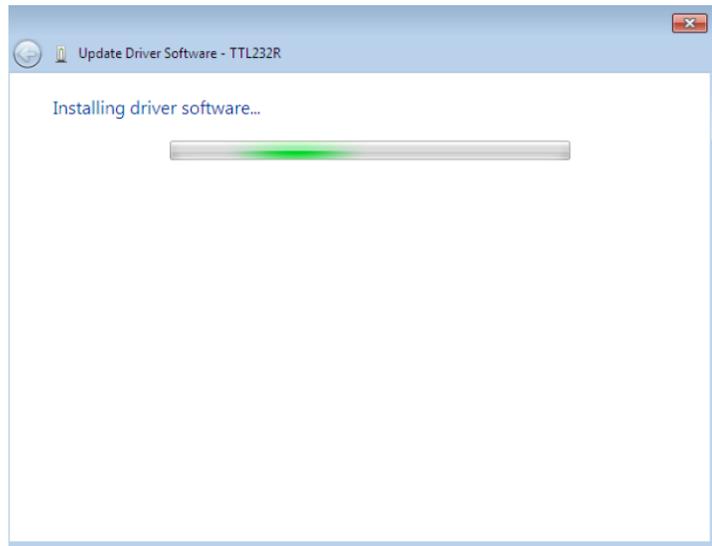


- 10) As before, select the **Browse my computer for driver software** option

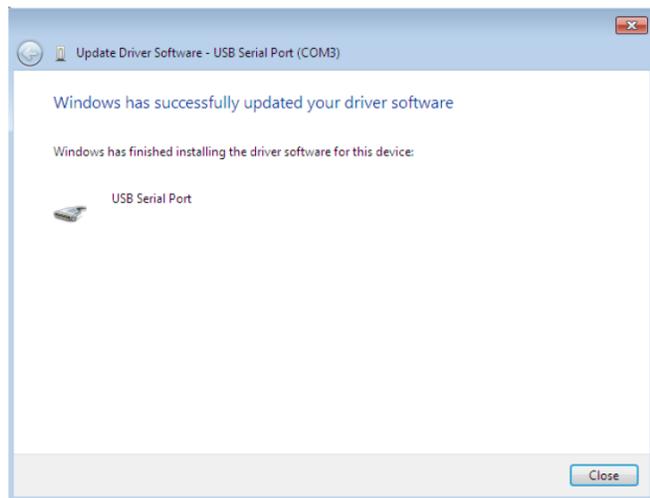


- 11) Click the **Browse** button and select the folder where you stored the driver previously downloaded. After selecting the file location, press **Next** to start the installation





12) When the installation is finished a completion screen is displayed. Note this screen also displays the COM port assigned to the device. Press **Close** to close this window and go back to the Device Manager Window.



The device will now be listed under Ports (COM & LPT) The exact com port assigned will not always be COM3 as in this example.

### Important

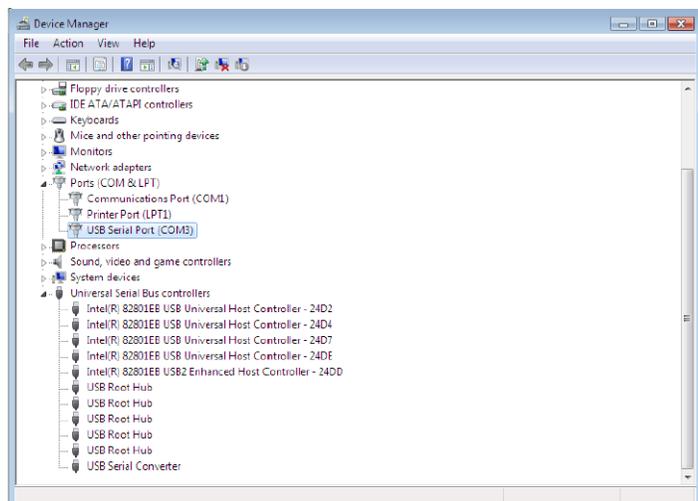
The programming console will only work with port numbers up to 16. If a number higher than 16 is assigned:

Right click on the device, choose properties

Click Port Settings

Click Advanced

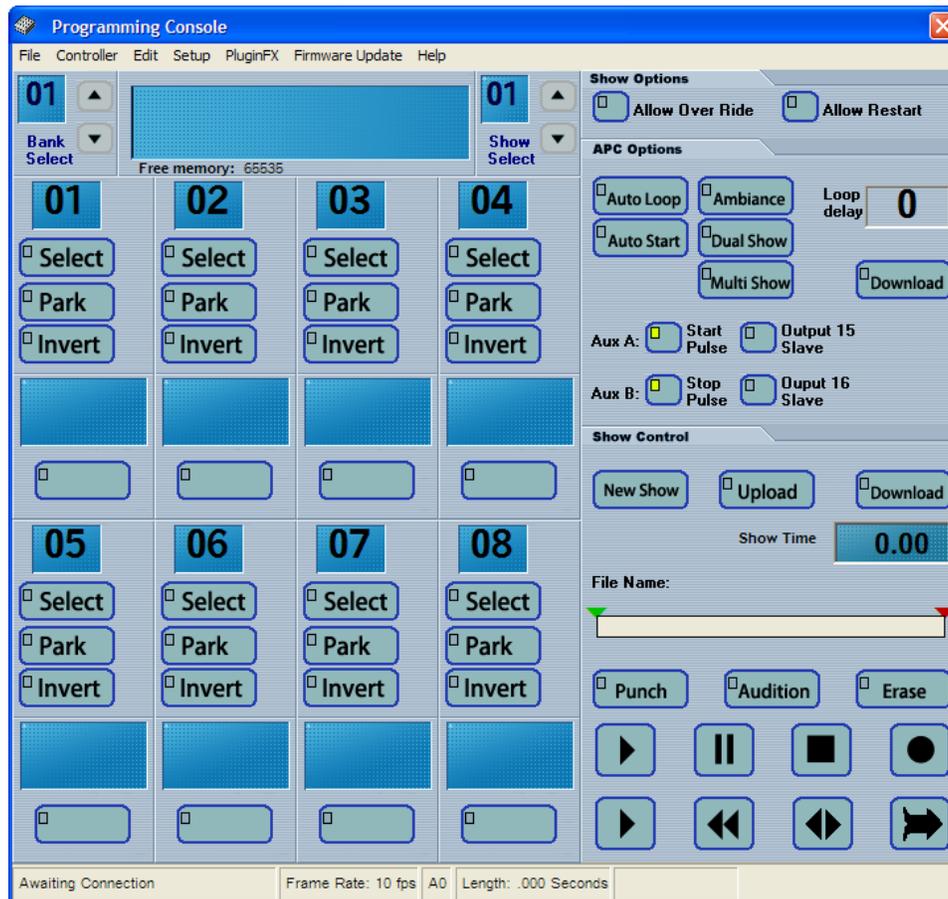
Pick a Com Port Number 16 or lower.



### 3.8. Show Creation Modes:

Shows can be created in one of two ways:

- **Real time:** The real time show creation process monitors key presses on the keyboard and/or input from joysticks to update the state of outputs on the APC directly. The various on/off states are recorded for future playback. There is no “programming” involved in the traditional sense of the word where you would “write a program”. A show is created in multiple passes (or layers) where as few as one, or as many as eight outputs can be programmed or recorded at one time. As you create each layer, previously recorded layers will play back so that synchronizing motions is easier.



- **Graphical:** The graphical editor allows you to draw the desired on/off transitions with an easy-to-use interface. The controller does not need to be connected when using the Graphical Editor. The show can be created and saved locally on the computer for download to the controller later.

### 3.9. Setup

- The COM port used for programming can be changed on this screen.



- Only available ports discovered on the computer will be listed.
- Select the desired port and Press **Done** to continue.
- When starting the Programming Console, if a port is not selected, or if the selected port is not available, the **Select Com Port** window will automatically appear.

**Note:** The Programming Console must be restarted for these changes to take affect.

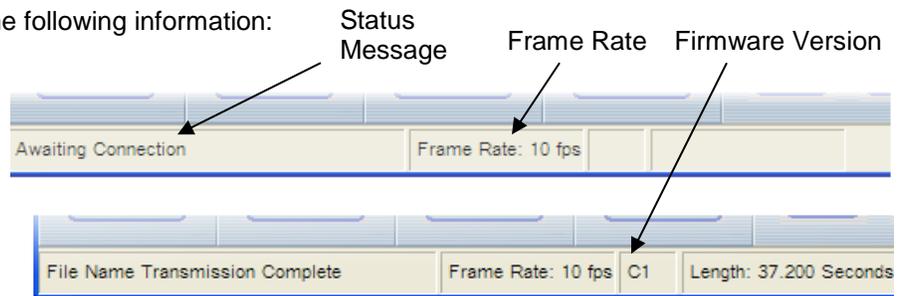
### 3.10. Connection:

At start up, the programming console software checks for a connection to the APC. If a connection is detected the current configuration information is uploaded to the computer. This process is automatic but can be forced by selecting **Reset** from the **Controller** menu.



The status bar displays the following information:

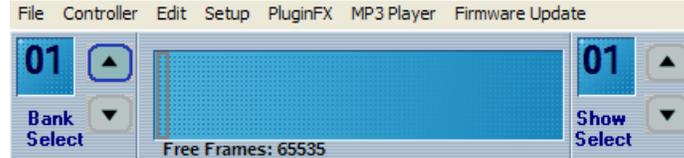
- **Status Message:** These messages indicate the current operational status of the system
- **Frame Rate:** The number of **frames per second** for the current show
- **Firmware Version:** The version number of the APC firmware



**Note:** If the detected firmware version does not match the version required by the programming console, an exclamation point (!) will appear after the version number.

### 3.11. Console Header

The console header contains 3 controls that are used during show creation.



**Bank Select:** The outputs on the APC24+ are displayed and manipulated in banks of 8. The **Bank Select** control enables you to select the desired bank

**Memory Usage Graph:** This area graphically displays the amount of memory each show is using. The number of free frames available is also displayed.

**Show Select:** When the ambiance show is enabled or the APC is configured for dual show, the **Show Select** control is used to choose the desired show.

### 3.12. Show Options:

Each show has two options that determine whether a playing show can be restarted or interrupted by other shows. Select the desired options then press **Download** on the APC24+ Options panel.



**Allow Restart:** When enabled, each trigger of the APC start input will cause the playing show to restart. When this option is cleared, the playing show will ignore additional triggers on the start input.

**Allow Over Ride:** When enabled, other shows can interrupt the playing show. When this option is cleared, the playing show will ignore any input trigger for the other show.

Changes to the show configuration will cause the **Download** button to turn red. Changes will not take effect until they are downloaded to the control.

Each show has its own configuration. This allows numerous different show start scenarios.

**Example configuration:** An APC is used to control two back-to-back scenes. Show 1 controls an elaborate scene using multiple outputs. Show 2 controls a pop-up in a previous scene. Show 1 should take priority over show 2. With the following configuration, show 2 will start to run the pop-up when input B is triggered. When Input A is triggered, show 1 will take over. Additional activations of either the A or B input will be ignored until show 1 is complete.

Show 1: **Allow Restart** – clear

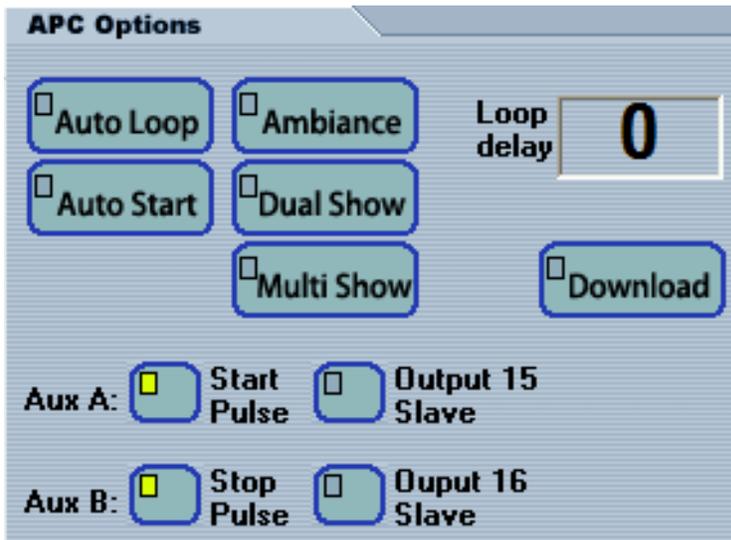
**Allow Show Over Ride** – clear

Show 2: **Allow Restart** – clear

**Allow Show Over Ride** – selected

### 3.13. APC24+ Options:

A number of options are available to configure the APC for the intended task. Select the desired options then press **Download**.



**Auto Loop:** The selected show, once started, will loop continuously.

**Loop delay:** Sets the delay between shows when configured for auto loop. This also sets the time between a show starting and the ambiance show beginning. This number is in tenths of a second. Enter 10 for a 1 second delay.

**Note:** A number of things can affect the overall loop delay.

There is a bit of overhead required to park the outputs and reset the controller between loops. This will be observed if you set the loop to zero. If a seamless loop is required, it can be simulated by manipulating the park states of the various outputs to prevent all of them from being off at one time.

If the MP3 player is attached, there is an additional delay while the file is being loaded from the media card.

**Auto Start:** Show 1 will start automatically after the APC powers up.

**Note:** Auto Start only works with show 1

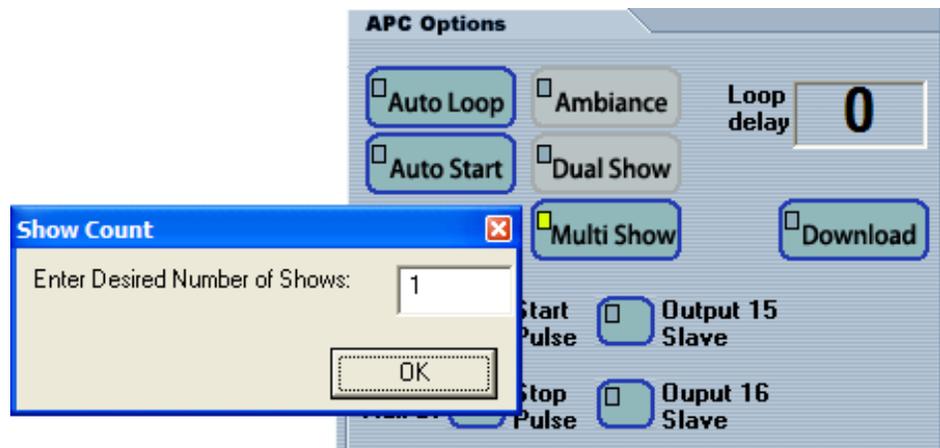
**Ambiance:** Enables the ambiance show. The ambiance show will automatically play when the main show ends.

**Dual Show/Quad Show:** Determines whether the controller can start two or four different shows. This option changes the function of inputs A & B (and C & D). If Dual show mode is not enabled, A is a start input and B is a stop input. If Dual show mode is enabled, Input 1 starts show 1, input 2 starts show 2 and there is no stop input. With Quad Show, Input 1 starts show 1, Input 2 starts show 2, Input 3 starts show 3, Input 4 starts show 4. **Quad Show requires a firmware upgrade.**

**Multi Show:** Enables Multi Show Option. This option changes the function of inputs 1 and 2. With Multi-Show option enabled, Input 1 functions as "Start Next Show" while input 2 functions as "Start Previous Show".

Up to 12 different shows can be created. When Multi Show is selected, a window will appear prompting you for the number of shows to create.

When **Multi Show** is enabled, you will notice the **Allow Restart** option is disabled. Since the inputs function as “Start Next” and “Start Previous” there is no way to trigger the current show so “allow restart” is not possible.

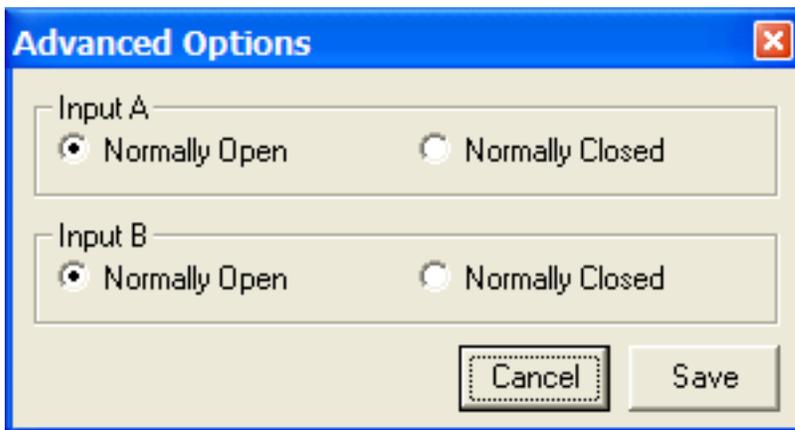
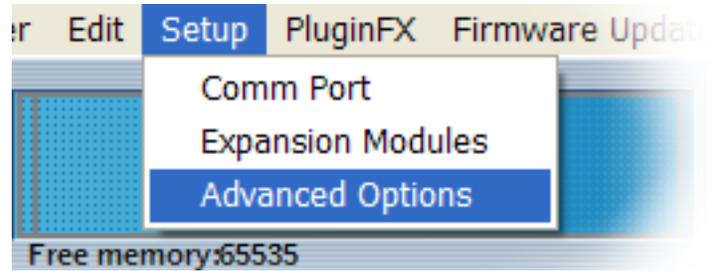


**Download:** Any change made to controller options, show options or any channel setting will cause the **Download** button to turn red. A red button means there are unsaved changes. Pressing **Download** will transmit all the configuration options to the APC24+ where they will be saved.

**Note:** This download button only transmits configuration options to the APC24+, it will not download a show file

### 3.14. Advanced Options

The APC can be configured to accept either a normally open or normally closed trigger input. Additionally, each input can have a different configuration if desired. These options are available from the **Advanced Options** selection on the **Setup** menu.



### 3.15. Output Channels

The programming console displays the available APC outputs in banks of eight. Each channel on the console has an identical layout and function. The channel number is displayed along with the name and the state of the various channel settings. When a different bank is selected, all of this channel specific information will be updated.

**Select:** This button is used to select the channel for programming. Only selected channels will respond while in Record or Audition mode. Additionally, only selected channels will appear in the PluginFX modules.

**Park:** This button is used to set the output state when the control is idle.

- If ambiance mode or auto loop is enabled, the APC will first set all of the outputs to their configured park state prior to starting the next loop or the ambiance show.
- Make sure that the total current draw of the parked outputs does not exceed the capacity of the output driver chips.

**Invert:** This button will reverse the output polarity of the desired output.

- Although this option can be used if a device is behaving opposite of what is expected (extended when it should be retracted) it is more commonly used temporarily during the programming process.

**For example**, a prop pops out of a box and bobbles around while giving a speech:

Typically, the mouth movement would be synchronized first to get it perfect before adding the other incidental motion. In this case, however the prop needs to be up out of the box to program the mouth.

There are a number of different ways to work around this issue. The easiest is to enable the invert button on the outputs needed to bring the prop out of its resting place. After programming the mouth movements, the polarity can be returned to its normal state and the remainder of the programming performed.

#### Output Name:

Each output can be given a unique name.

Right click the output name box to edit the name.

Press enter or move your cursor out of the box to complete the edit.

Output names can contain any alphanumeric character. Output names longer than 16 characters will automatically be shortened.

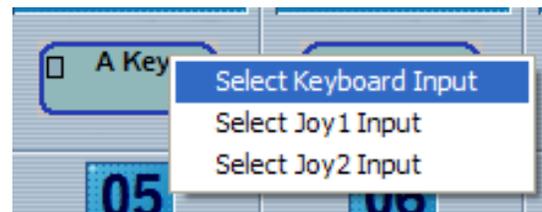
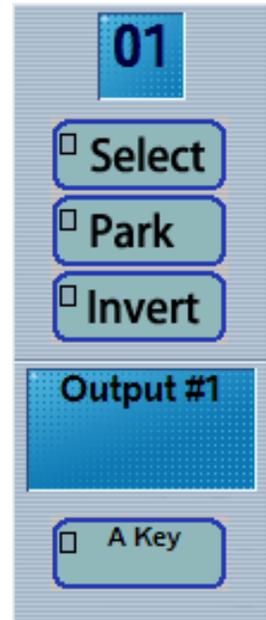
#### Input Trigger:

Each output has a trigger assigned to it for programming.

The trigger is selected from a list of keyboard keys and/or joystick inputs.

Right click the trigger input and choose the desired device from the popup menus.

When using the keyboard as an input device, you will probably find that certain combinations of keys are not recognized when pressed simultaneously. This is due to the hardware configuration of the keyboard and cannot be prevented. You will have to try other key combinations to find one that works for your keyboard.



**Note!** Any change to a channel will cause the **Download** button in the APC24+ Options frame to turn red. The changes will take affect after they are downloaded to the APC24+

### 3.16. Show Control

The Show Control panel contains all the controls used to record and playback shows.

**New Show:** see **New Show** section

**Upload & Download:** See **Upload and Download Show**

**Show time:** Displays the elapsed show position in seconds.

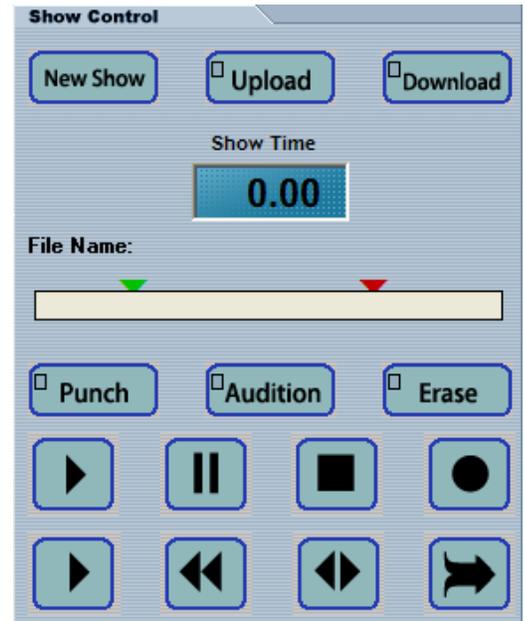
**Punch:** This button, in conjunction with the punch edit input signal, allows you to selectively program parts of a show. When punch editing is enabled, input signals will only be captured if the punch edit input signal is also activated.

To assign the punch edit input device, right click the **Punch** button and select the desired input from the pop up menu.

**Audition:** This button allows you to test that your channel input assignments are working as expected. With **Audition** enabled the input (key or joystick) for any selected channel will activate the corresponding output on the APC24+

**Erase:** See **Erase Show** section

**Show Control Buttons:** These eight buttons are used to play and program shows. Their functions are designed to be intuitive and, with a few specific exceptions, mimic the controls of a media-playing device. This is one of the reasons we refer to the process of creating a show as “recording”.



**Play:** Plays the currently selected show.



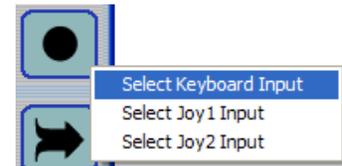
**Pause:** Pauses a show during Play, Preview or Record operations.



**Stop:** Stops the currently playing show.



**Record (Program):** This button is used to begin a programming session. The record start input is also set by right clicking on the record button and choosing the desired input



**Preview:** Plays the results of the last recording session. The HauntBots show recording process is non-destructive- your recording session is not finalized until you merge your changes with the main show. This gives you the opportunity to re-record a layer if you feel that you could do a better job while, at the same time, not losing what you’ve already done just in case your second attempt isn’t better.



**Rewind:** Causes the show to jump back 8 seconds every time it is clicked.



**Seek:** Enabled when show is Paused or Stopped. Pressing the seek button turns on the blue seek arrow, dragging the arrow along the timeline allows you to move to any point in the show



**Merge:** This button takes your most recent recording session and merges it into the main show.

**File Name:** Displays the name of the audio file selected during **New Show** setup. A file can also be loaded directly from this window but doing so will not change the length of the show. If an audio file is selected, it will play from the computer and will be kept in sync during any pause, rewind or seek operation. To select an audio file from this window, double click **File Name** and browse to find the desired file. The programming console expects all audio files to reside in the audio folder created when the programming console was installed.

**Show Control Timeline:** The Timeline is a graphical display of the current show position. The arrows enable finer control of the recording process.



**Show Start Point:** The Green arrow designates the point where the show will start when the **Play**, **Preview** or **Record** buttons are pressed.

**Show Stop Point:** The Red arrow designates the point where the show will stop when in play, preview or record mode.

**By clicking and dragging the Show Start and Show Stop points you can easily create a show one section at a time, refining the details of each section before going on to the next.**

**Show Seek Point:** The Blue arrow is enabled by pressing the **Seek** show control button while the show is paused. Dragging this arrow along the timeline allows you to move to any point in the show.

### 3.17. New Show:

To begin programming a new show:

- Select **New Show** on the Show Control panel.

The new show window will slide open.



The minimum information required to create a new show is show length and the frame rate.

The minimum information required to create a new show is show length and the frame rate.

- Enter the desired show length in seconds or frames.
- Alternately, you can select an audio file and the show length is calculated automatically.

**Note:** For proper operation all audio files should be placed in the Audio folder that was created when the programming console was installed

- The frame rate represents the number of times per second that the APC outputs will be updated. It is best to choose the lowest resolution that will achieve the desired result. Lower frame rates consume less memory and have faster upload/download times. Several frame rate choices are available.

Press **Cancel** to abandon the new show or **Done** to continue



### 3.18. Open and Save Show:

The **Open** and **Save Show File** selections on the **File** Menu enable you to save shows on the host computer and reopen them later.



#### Used For:

- Backups
- Loading multiple controllers with identical shows
- Editing shows with the Graphical Editor

**Note:** As with any software, it is a good idea to periodically save your work as you create a show. This gives you something to fall back on in the event you make a change that you don't like or encounter a glitch in the Programming Console.

### 3.19. Upload and Download Show:

The **Upload** and **Download Show** selections on the **Controller** menu enable you to exchange show data between the host computer and an APC.



#### Used For:

- Backups
- Loading multiple controllers with identical shows
- Editing shows with the Graphical Editor

**Note:** As the show is recorded and layers are added, the complete show only exists in the computer. Before the ending a session, the show should be downloaded to the controller. If you are familiar with previous versions of the HauntBots Programming Console, this will be a major change.

Please remember to download your show to the APC24+ before exiting the software.

### 3.20. Erase Show and Erase All:



The **Erase Show** and **Erase All** selections on the **Controller** menu enable you to clear the show memory in the APC. These utilities are useful if the show memory becomes fragmented.

The APC requires each show to fit into uninterrupted memory space. While creating and erasing shows it is possible that you may have enough free memory for a desired new show but that it is not in one block.

If this is the case, upload the existing shows you want to keep and save them locally to the computer. Erase the APC and then one by one download the saved shows back to the controller. They will fill the memory sequentially leaving the free space in one contiguous block at the end.

### 3.21. Sample Recording Session:

#### Basic Show Recording

A layer is a number of outputs that you intend to program simultaneously. Selecting a layer is the first step to programming a show.



The Programming Console can be used to program a maximum of 8 outputs at one time. Typically, however, a smaller number will be selected.

Choose the output or outputs that you intend to program by pressing the appropriate channel **Select** buttons.



Before recording, the channel trigger inputs can be tested by pressing the **Audition** button.

The programming console will function as though it is recording but nothing will be saved.



Press the **Record** button, the **Record Ready** window will appear.

To begin recording:

Click **OK** - Press Enter – or - activate the record start input.

The selected outputs will respond to the joystick and/or keyboard in real time.

If previous layers have been recorded these will play as well.

The show will run until it reaches the selected show length or the Show Stop Point (Red Arrow).

Press **Preview** to see the show with the addition of the newly programmed layer.

**OR**

Press **Play** to see the show without the new layer.

Press **Merge** to make the changes permanent. The merge process takes the show data in the preview buffer and applies it to the show buffer.

You should periodically save your show as you work on the various layers. One suggestion would be to save the show file on the computer every time you merge a new layer.

**Note:** The underlying architecture of the programming software has been completely re-written. If you are familiar with the merge times of previous versions of the software, you will be surprised with how fast the merge now happens.

This new speed does come at a price. All show data is now handled by the programming console and you must remember to download the show to the APC24+ prior to exiting the software.

Each time you select channels for programming, the preview buffer is discarded. If you have un-merged changes in the preview buffer you will be warned before this happens. Un-merged changes are lost when new channels are selected.



## Editing and Advanced Recording

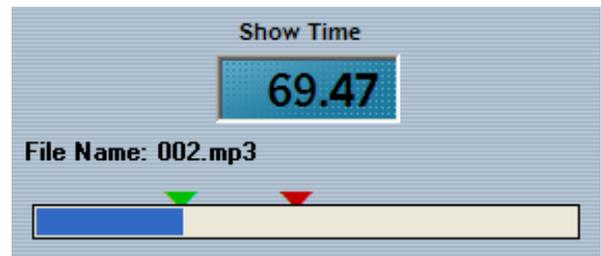
After recording a layer and previewing the results, you may wish to go back and fix or tweak certain parts. There are several tools available to make this process easier.

The **Seek** button allows you to quickly move to any point in the show. Pressing the **Seek** button activates the blue **Show Seek Point**. Click and drag the arrow along the timeline to the desired position and release. You can now **Play**, **Preview** or **Record** from this point forward.

The Rewind button enables you to step backward through the show in 8-second increments.



The Show Start Point and Show Stop Point arrows are used to pinpoint a section of the show. This is useful if you have a small section of the show you wish to tweak but you don't want to risk recording over a section further down the timeline. Click and drag the Show Start Point to the beginning of the section you wish to edit and move the Show Stop Point to the end of the section. While recording, you'll have no worries about hitting the stop button in time. As you finish each section, you can move the arrows along to the next area you wish to re-record.



This tool is not limited to editing, if you wish, you can create your entire show in this manner.

Punch editing enables you to fix very small mistakes without the risk of recording over finished sections of the show. To use punch editing you first assign a key or joystick input as the punch edit signal. To assign this input, right click the **Punch** button and select from the pop up menu. When the punch edit signal is activated, the light on the Punch button will turn red.

Start recording; the selected inputs will only respond when the selected punch edit signal is also active.

The punch control can be used in conjunction with all of the previously described editing tools.



**Notes:** When using the pause, seek and rewind buttons there are a few things to keep in mind.

When the show is paused, any output that was on when the Pause button was hit will remain on. For most animatronics, this is not an issue as the character is never more than a few seconds away from where it is supposed to be.

If you are using a variable rate MP3 file, you may find that the positioning is not consistent. This can be alleviated by switching to either constant bit rate MP3 files or WAV files.

### 3.22. Graphical Editor

The **Graphical Editor** can be used to edit an existing show or create a show from scratch.

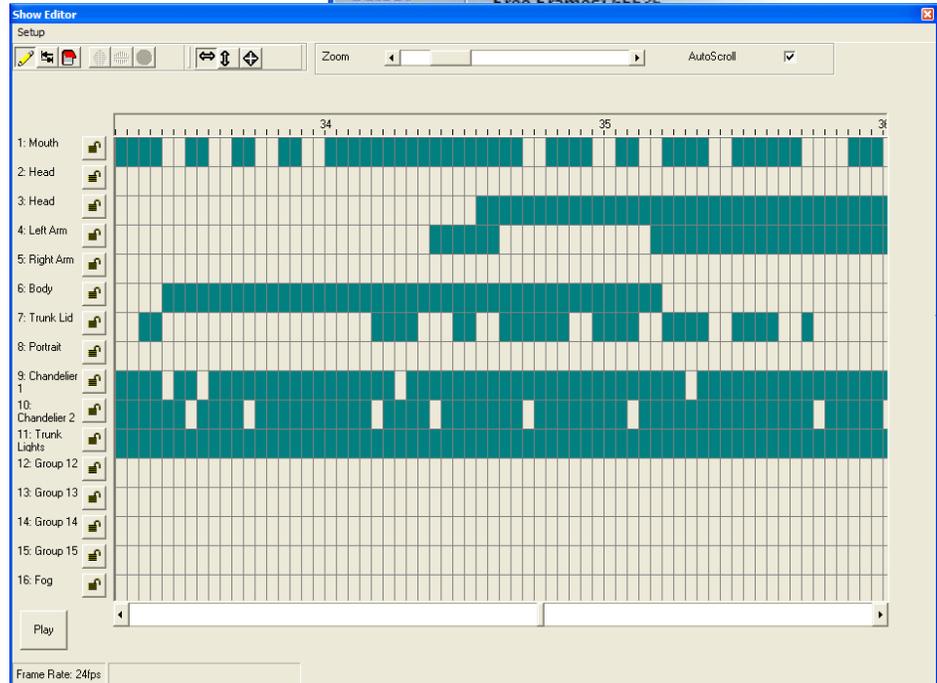
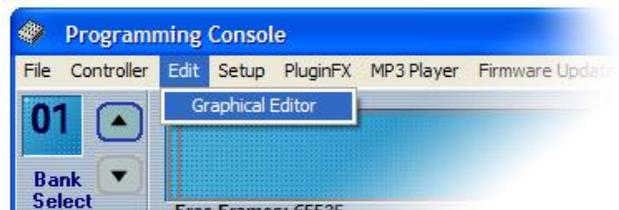
To edit, choose **Graphical Editor** on the **Edit** Menu.

If there is no show in memory, the **New Show** window is displayed where you can select the desired show length and frame rate.

On the edit window, each row represents an output and the columns are frames.

You can scan through time by using the slider at the bottom of the screen.

The slider at the top of the screen allows you to zoom in and out.



The pencil enables you to draw or erase your show. Clicking and holding the left mouse button while dragging will fill in frames, alternately, holding the right mouse button will clear frames.

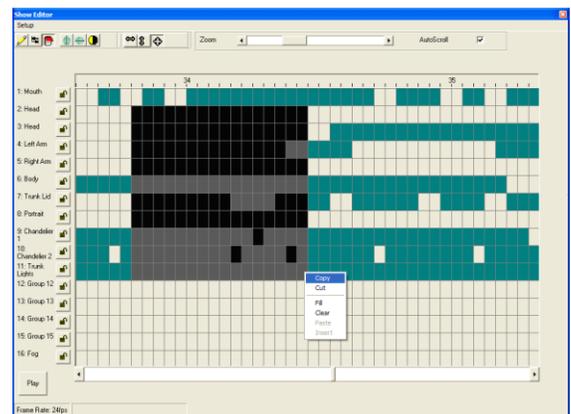


The Trim control changes the show length. Left clicking in any frame will move the start point to that frame, Right clicking in any frame will set the end point.



The Copy / Paste control enables you to select a block of frames and copy them to the clipboard. This block can then be pasted somewhere else in your show. Left click and drag to select the desired block of frames then right click to bring up the menu. You can copy the selected frames to the clipboard for later use by choosing **Copy** or **Cut**. Cut will clear the selected block and the frames to the right will shift left to fill the space. You can also use this menu to **Fill** or **Clear** the selected block of frames.

The frames in the clipboard can now be pasted or inserted by right clicking the frame that represents the upper left hand corner of the block to be pasted. **Paste** will take the contents of the clipboard and add it to your show, overwriting anything that might be in the target block. The **Insert** command will push existing show frames to the right to make room for the new block of frames.



The frames that are copied to the clipboard can be manipulated with these three buttons before pasting them back into your show. The first button will flip the frames left to right causing them to play back in reverse. The second button flips the frames top to bottom

in relation to the rows of outputs. Finally, the third button inverts the frames turning off frames that were on and vice versa.

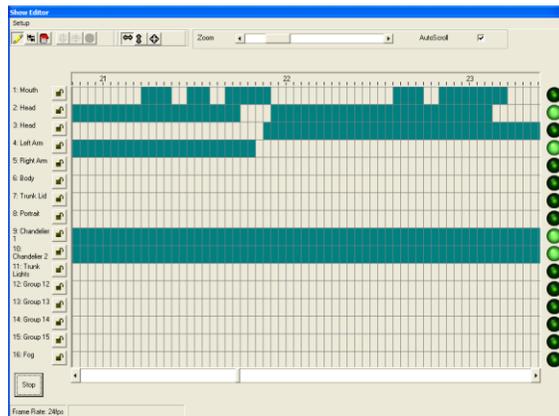


The three buttons with directional arrows can be used to constrain your mouse to edit individual outputs, individual frames or allow you to freely draw over the entire window. These constraint tools work for both Drawing/Erasing and Copy/Paste modes.



The **Play** button allows you to view the show on the on-screen display.

The show frame rate appear on the right



will play at the selected and the output state will the green indicators at hand side of the screen.

the show will play screen indicators.

simply close the editing to keep and save your

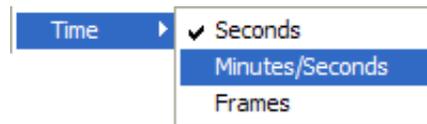
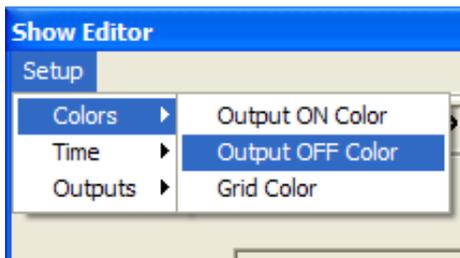
changes locally on the automatically download will be prompted to

**Note:** If the APC is connected, through it rather than the on

When you are finished editing, window. You will be prompted changes.

Remember that saving your host computer does not the new show to the APC. You download the show to the controller.

Several options are available under the Setup menu to change the appearance of the graphical editor. Changes made here are saved as preferences and will be used every time the editor is opened.



### 3.23. PluginFx

The HauntBots Programming Console comes with several software plug-in applications to help automate the show creation process. PluginFx are used during Real Time Programming. You can think of them as autopilots. Certain programming tasks are rather cumbersome to perform manually. For instance, suppose you have a light that you want to flash on / off at some predetermined rate. You have two options:

Draw the on / off time transitions in the graphical editor.

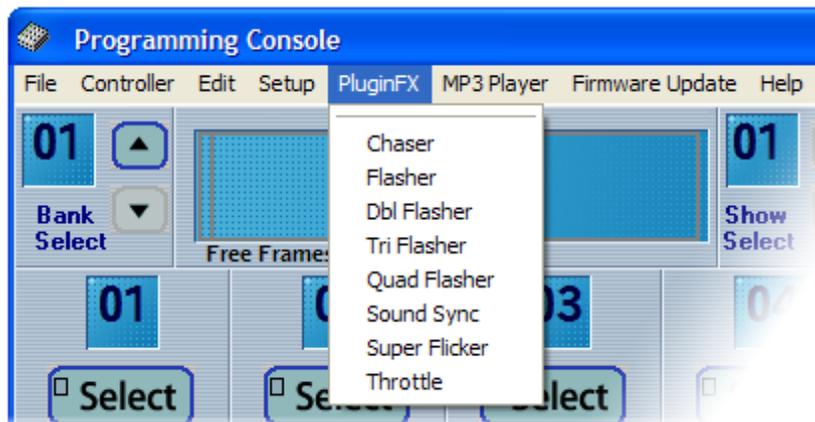
OR

Continually press a key or button during a real time programming session.

PluginFx offer a third solution; open the **Flasher** plug-in, Pick the output you want to program, then, set the flash rate. While the plug-in takes care of flashing your light, you are free to program a different output.

Each PluginFx module has unique functions, but they are used in a similar fashion:

- Pick the module you want to use from the **PluginFx** menu
- Select the desired outputs from the drop down list. Only outputs that are part of the current programming layer will appear in the list
- Some PluginFx can operate more than a single output
- Adjust any effect specific parameters
- Begin recording
- PluginFx parameters may be adjusted while recording

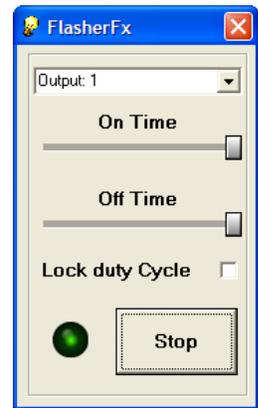


**Note:** Only outputs selected for programming will be available to the PluginFx

## Sample PluginFx Modules:

### FlasherFx

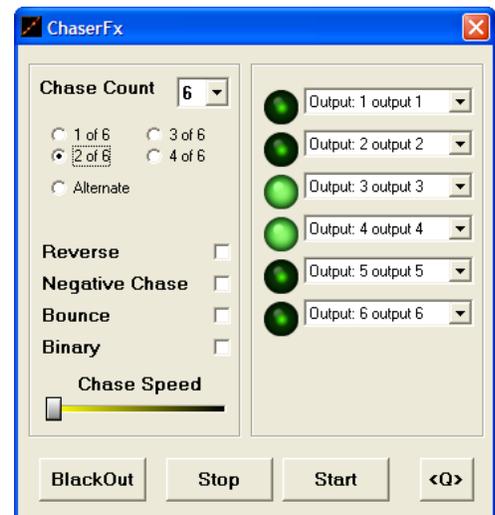
Assign the FlasherFx to an output and it will turn that output on and off for the duration of the program. You can vary the **On Time** and **Off Time** parameters individually or check **Lock duty Cycle** to create an even flashing pattern. While the show is recording, you can vary the flash rate as well as start and stop it. If you need more than one output to flash, you can load up to four flashers by selecting **Dbi**, **Tri**, or **Quad** Flasher.



### ChaserFx

The ChaserFx can program up to eight outputs at one time. The standard chase pattern is one on and the rest off; however, various chasing patterns and adjustments are available:

- **Chase Count** determines how many outputs will be used. You can choose between two and eight
- **Reverse** causes the chase direction to reverse
- **Negative Chase** turns one light off and the rest on
- **Bounce** causes the chase direction to reverse at each end
- **Binary** creates a binary counting pattern
- **Chase Speed** ranges between one step per frame and one step per frame rate. (The slowest rate for a 10fps show would be one step per 10 frames)
- **<Q>** This button quick loads the output assignments



### Sound SyncFx

The Sound SyncFx can be used to create rudimentary lip-syncing or lighting effects when used with an appropriate sound source.

This plug-in causes an output to respond to variations in sound. Any audio playing on your computer will appear graphically on the bars.

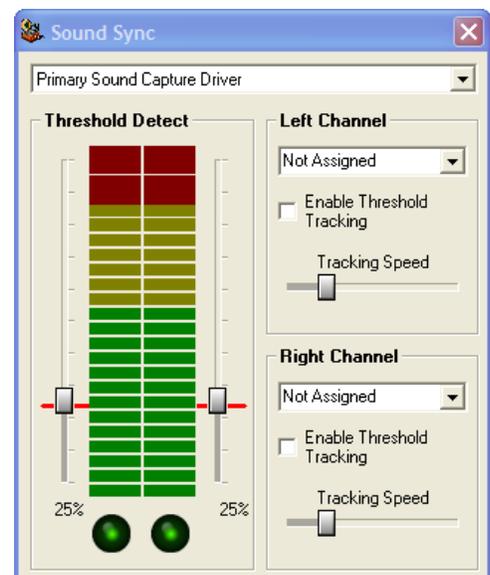
A different output can be assigned to the left and right audio channel.

The vertical sliders are used to set the trigger threshold for each channel. An audio signal greater than this value will activate the output assigned to that channel.

In similar controls, once the sound exceeds the desired level the output typically would remain on. This is not usually the desired effect. Threshold tracking was created to help eliminate this problem.

Clicking the **Enable Threshold Tracking** box causes the threshold slider to automatically seek the highest sound level. This is useful when you have material containing both soft and loud passages.

The **Tracking Speed** slider determines how quickly the Threshold slider moves.



### 3.24. Firmware Update

Firmware updated is not currently available for the APC24

