

# NLED Aurora Control Software – v3.4.0

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Various NLED controllers are compatible with the NLED Aurora Control software. The software is used to create a multitude of patterns and sequences on a computer then, upload them to the compatible controller for the device to run by itself, without a computer connection. The simple GUI makes it easy for anyone to create custom color sequences of any sort and upload them to the controller. Great for LED projects that requires custom color sequences. In addition to standalone sequences, it also supports Live Control, send packets over USB or serial to the device for direct control of the outputs. It supports single color, RGB, or RGBW LED configurations. Along with capabilities for pixel mapping and other advanced layout features.

**We need feedback, please contact with any comments, questions, or bug reports.  
All feedback is appreciated. [Support@NLEDshop.com](mailto:Support@NLEDshop.com) or [www.NLEDshop.com/contact](http://www.NLEDshop.com/contact)**

## **Color Sequences:**

Are dynamic data sets that hold the colors, patterns, and effects that the software generates. Each is based on Sequence Mode(described below) and contains data specific for the Mode being created.

When changing sequence modes, data from mode to mode may persist. That allows the user to do more advanced uses like load a File type, and switch to Fade mode. Which would allow the data loaded in the File mode, to fade from value to value. POV is another example, load an image into the software via the POV sequence mode, then change to Fade mode and utilize the image's data for Color Sequencing.

**Sequence Modes:** Each Sequence is based on a Sequence Mode.

### **Sequence Mode - Fade: (aka Ramp/Chase)**

Pixels fade evenly from value to value(frame to frame). Start values can be adjusted to start a pixel fading from an offset start position. Each pixel has an individual value/color for each frame. Start Values can be set individually.

### **Sequence Mode - Gradient: (aka Ramp/Chase)**

Allows color sequences with gradient/fades/offsets to be created using very little memory space. It has options to offset the Start Values dynamically and quickly create great looking color sequences. Every pixel shares the same color, frames can have different colors. This is a memory efficient version of the Fade sequence mode. Start Values can be set individually.

### **Sequence Mode - Instant: (or Solid/Jump/Flash)**

Pixels change instantly from color to color(frame to frame) at the selected speed. Each pixel has an individual value/color. The start value defines the starting frame number, and each pixel can be set individually.

Note: Slide up and Slide down are no longer supported. And are only available in the version 2 software.

### **Sequence Mode - Scene:**

Only supports 1 frame. The colors set in that frame stay static and do not change. There are no Start values.

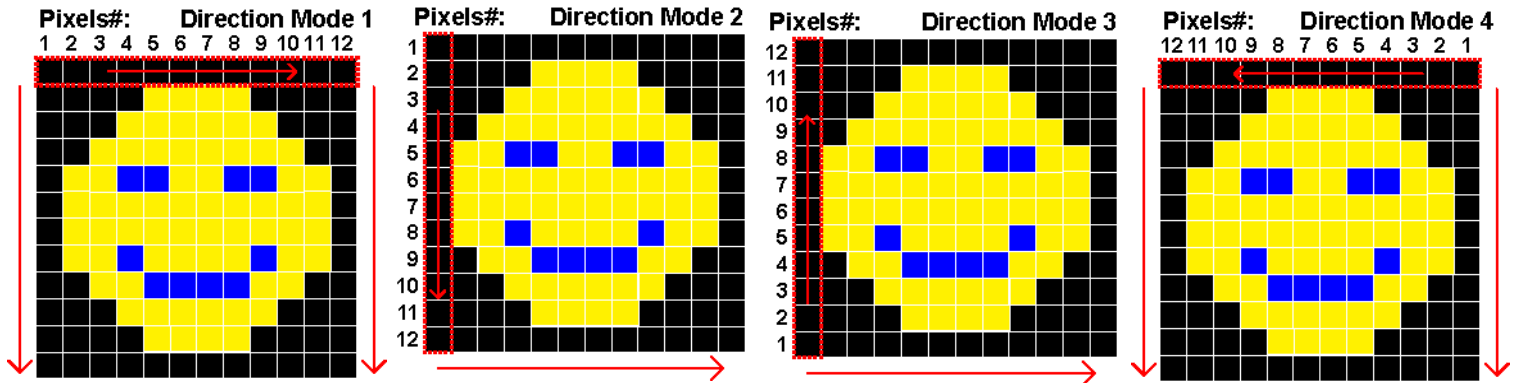
## Sequence Mode - P.O.V.(Persistence of Vision):

Persistence of vision can utilize images or video files to create color sequences that can be played on flow toys such as staffs, poi, and wheels, or anything else that moves quickly. A POV color sequence will display the image or video used to create it when the pixels are moved through the air or rotated. This mode is really on suitable for pixel controllers but is available on all controllers. How fast the POV can display is based on the number of connected pixels and the chipset(if using addressable pixels), the chipset limits how fast data can be updated and is the limiting factor on update speed(FPS).

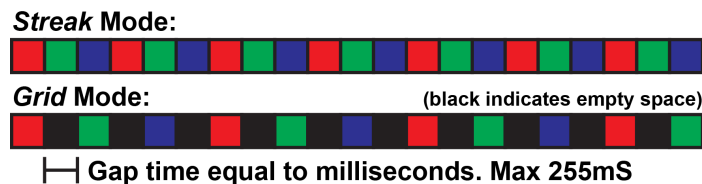
**P.O.V. Direction Modes:** There are 4 ways an image can be loaded, the mode is dependent on the physical LED positions relative to the controller, the order of the pixels, and expected function of the final project. Some experimentation may be needed to find the one that will work for your project.

Note the “first pixel” would be the pixel closest to the controller in the strand.

1. First Pixel Is On The Left. Rows Are Displayed Top To Bottom
2. First Pixel Is Top Left. Columns Are Displayed Left To Right.
3. First Pixel Is Bottom Left. Columns Are Displayed Left To Right
4. First Pixel Is On The Right. Rows Are Displayed Top To Bottom.



**P.O.V. Streak or Grid:** There is an optional setting that will place gaps or spaces between displayed POV frames. In streak mode, the pixels will form a solid streak, as the color frames are displayed one after the other. In Grid mode, empty space is placed between frames, the higher the value in milliseconds, the larger the spacing. This will make it appear more of a grid of light dots, rather than rows of streaks.



**P.O.V. Video Mode:** This advanced persistence of vision mode allows a video or movie file to be loaded into the software rather than a static image. Each frame of the video file is played like an image would be, but multiple video frames are played in sequence. Just as the video file would play normally, the LED controller will display it as a series of POV images when played. Video content should be prepared and sized for the exact amount of pixels it will be played back on. Videos should be as short as Video POVs can be quite large and consume a lot of storage memory. Allow the software time to transcribe the video file when loaded. These must be encoded in a lossless codec, any compression will create grey/muddy/poor quality effect.

**Load File:** Found on the tool sidebar under the Sequences menu. The button loads a POV image or video file into the software. Supports all image file formats excluding GIF and possibly others. Video is not yet supported, and formats are TBD.

## Sequence Mode - File:

Loads a user created data file to use as the color values. The file can be created manually, or dumped from other software, such as a DMX sequencing program. There are no *start values* for this mode, all pixels start on on Frame #1.

### Formats:

- **TXT/CSV:** Data values are encoded as standard/readable strings. Each line is converted to a frame. The first data value(s) on each line is applied to pixel #1. The number of frames is set to the number of lines, the number of pixels is set to the number of data values(1 for mono, 3 for RGB, 4 for RGBW) on the first line.
  - Standard .TXT files, UTF-8
  - Each line is a Frame. If there are 3 lines, there will be 3 frames
  - On each line, data values are comma(,) delimited.
  - Data values should be 0 to 255 for 8-bit processors, and 0 - 65,535 for 16-bit color supported devices.(no commas!)
  - Data values should be written as ASCII strings. IE "255" equals 255, and not any characters with an ID of 255.
  - The amount of lines determines the amount of frames, the amount of data values per line determines the Channel Amount. Both values are automatically set by software when the file is loaded.
  - Example files can be found in the 'assets' folder included with the software.
  - All 'whitespace' is stripped
- **BIN:** Binary encoded, not human readable. The first 16 bytes is the file header. Data is converted in the same order that it is stored in the file.
  - Header, Byte 0: Data size, 16-bit MSB. Data size is the number of bytes per frame. Example: 256 RGB pixels the data size is 768 bytes per frame. 128 RGBW pixels the data size is 512 bytes per frame.
  - Header, Byte 1: Data size 16-bit LSB.
  - Header, Byte 2: Speed 16-bit MSB. In milliseconds.
  - Header, Byte 3: Speed 16-bit LSB. In milliseconds.
  - Header, Byte 4: Number of frames, 32-bit MSB. HEX xx000000
  - Header, Byte 5: Number of frames, 32-bit. HEX 00xx0000
  - Header, Byte 6: Number of frames, 32-bit. HEX 0000xx00
  - Header, Byte 7: Number of frames, 32-bit LSB. HEX 000000xx
  - Remaining Bytes 8 to 15 are unused.

**NLED Live Patcher:** Is able to record serial streams to a text file. The recorded files are compatible with File sequence mode. Please go to For downloads, instructions and details. Can be used with software such as Glediator or Jinx! (no affiliation to any of those)

Download the software and documentation: <https://www.NLEDshop.com/nledlivepatcher>

**NLED AllPixMatrix:** Outdated, not recommended. Used to play content such as video files, images, and generated content. Allows mixing and effects to create the output.

Download the software and documentation: <https://www.NLEDshop.com/nledallpixmatrix/>

**NLED AllMatrix:** Web browser/Javascript based app that supports videos, images, generated content, camera feeds, and effects. The content feeds can be mixed, layered, and have effects applied. The output can be displayed directly onto a LED matrix/panel, saved to a file, or streamed in various formats.

Download the software and documentation: <https://www.nledshop.com/allmatrix/>

## Sequence Mode - List:

This sequence mode allows multiple other sequences to be chained or list together. That is, it will play the first sequence on the list, then the next, and so on, then start back at the first sequence. The user can select when the next sequence starts using either iterations(loops) or a timer in seconds. The maximum timer or iteration value is 65,535 seconds which is about 1092 minutes. Note: -/+1% timing.

- Click on the grey *List* slot and color sequence selection menu will open. Select a sequence to place into that slot.
- Choose to either use iterations(loops of the sequence) or to use a timer(value in seconds)
- The transition type drop down offers four options for transitioning from one sequence to the next. Either Fade(ramp) with two speeds, Instant transition, or Per Sequence. Per sequence is set by the "Transition In" sequence setting found the on the left side tool menu.
- Use the + and - frame buttons on the bottom of the window to add additional *List* slots. Up to 256 slots are supported.
- Use the side scroll bar to scroll through the currently available list slots. Or use the mouse wheel.

## Sequence Mode – Technical

Not yet implemented, will be added in the future. Will allow exact creation of sequences with solid colors, fades, and all sorts of advanced sequencing.

## Sequence Generator – Image Wizard

Imports an image file to use for the source of the sequence's color data. The imported image data is applied to a corresponding pixel color based on the mode.

### Mode:

- **2D Static:** Applies the image data to the color sequence based on the pixel map. Works best with grid aligned pixel maps. The color sequence's *Number of Pixels* is automatically set to the number of pixels in the image, which is the width x height of the image.
- **Rows, Top To Bottom:** Each row of the loaded image is converted into a single *frame*. Parsed from the top row to the bottom row. The color sequence's *Number of Pixels* is automatically set to the width of the loaded image. The number of frames is set to the height of the image.
- **Rows, Bottom To Top:** Each row of the loaded image is converted into a single *frame*. Parsed from the bottom row to the top row. The color sequence's *Number of Pixels* is automatically set to the width of the loaded image. The number of frames is set to the height of the image.
- **Columns, Left to Right:** Each column of the loaded image is converted into a single frame. The top most image pixel is applied to pixel #1. Columns are parsed left to right. The color sequence's *Number of Pixels* is automatically set to the height of the loaded image. The number of frames is set to the width of the image.
- **Columns, Right to Left:** Each column of the loaded image is converted into a single frame. The top most image pixel is applied to pixel #1. Columns are parsed right to left. The color sequence's *Number of Pixels* is automatically set to the height of the loaded image. The number of frames is set to the width of the image.

**First Pixel:** Selects if the image data should be applied starting on the left or right for rows, and top or bottom for columns. Not applicable for mode 2D static.

**Action:** Only applicable for mode 2D static. Selects if the image data should be applied to the currently selected frame, add a new frame, or create a single frame which converts the sequence mode to *Scene*.

**Import Image File:** Opens a file dialog used to select an image file. All standard image file formats are supported. Due to how image files are formatted and compressed, lossless formats like PNG, BMP, or GIF will produce the best results. Formats such as JPG are considered 'lossy' and are compressed which cause artifacts, noise, and blurring. Converting a lossy format such as JPG to a lossless such as PNG does not remove those issues.

**Apply to Sequence:** Applies the converted image data to the color sequence and closes the image wizard.

**Cancel And Close:** Closes the image wizard without any changes to the color sequence.

## **Hardware Tab:**

All the configuration settings for the hardware/device can be found here, such as memory size firmware version, bootloader versions and additional device details.

## **Connecting to Hardware Devices:**

After starting the software with the device already powered and connected to the computer over USB, open the hardware tab and select the COM/Serial port the device was assigned from the drop down menu. If using a USB to serial adapter, select the correct baud rate for your device. Once port and baud rate are selected press the 'Connect' button to attempt connection to device. If it is successful the Hardware Info section will populate, check the message log for additional details.

To automatically connect to a device press the 'Auto' button, this scans all serial ports, be careful if you have other serial devices. Alternatively the 'Connect' button in the status bar will auto-scan and connect.

## **Device Configurations:**

Once the device is loaded, the software will generate a module for each of the Configuration Settings.

## **Upload Configurations:**

Using the device datasheet and your project requirements, setup the needed Configurations Settings using the modules. When finished, click the "Upload Configurations" button.

## **Download Configurations:**

To view the connected device's Configuration Settings, click the "Download Configurations" button. The configuration modules will then flash red, which indicates they have been updated and now match the devices settings.

## **Bootloader Mode:**

This button enters the connected device into bootloader mode. Bootloader mode allows new or updated firmware to be uploaded to the device over USB or serial(using a serial adapter). Please see device datasheet and [www.NLEDshop.com/bootloader](http://www.NLEDshop.com/bootloader) for details. Bootloading requires separate software.

## **Visit Device Webpage:**

Opens the [www.NLEDshop.com](http://www.NLEDshop.com) webpage for the currently loaded device. Find firmware updates, datasheets, and more details for your device.

## **Check For Device Updates:**

Opens the [www.NLEDshop.com/deviceupdates](http://www.NLEDshop.com/deviceupdates), that webpage will list the most up-to-date firmware images for NLED controllers and products.

## **Set User ID Number:**

The user ID number is a method of addressing NLED devices. When the device connects to the software it provides it's UserID number. The user can use this ID number to assign devices an address that can be polled by third-party software applications. This allows up to 256 NLED serial devices to be connected to a single computer, and still allow devices to be controlled independently.

Operating systems assign serial/COM ports, and there is no guaranteed scheme of the naming. The UserID number allows complex addressing and control.

An example usage scenario: A 19,000 pixel LED screen was controlled with 36 NLED Pixel Controller Electronics and a single computer(with a few USB add in cards and multi-port hubs)

## **Software Tab:**

All the settings and information for the software are found here. Including the options to load and save Sequence files. Change user interface options, and view version information.

## **Sequence Files:**

- **Load Sequences File:** Load a sequence file from the computer. (.auroraseq or .txt)
- **Save Sequences File:** Save the current sequences to the currently targeted file path. See title bar for path details.
- **Save Sequences File Save As:** Saves a file to a new file path. Saves it and sets the target file path.
- **Reset Sequences:** Deletes all color sequences currently loaded.
- **Load Single Sequence:** Opens file dialog to select a Sequence file. It will then display all the file's sequences and the user can select one to copy into the current Color Sequences.
- **Emulate Controller:** Emulates/Simulates a NLED device. Not a common use.
- **Sequence File Description:** The user can put in a text description to describe what the file is for and any other notes they want.

## **Software Demonstration:**

Loads a sample Color Sequence file, which populates numerous color sequences and settings. The user can then try out and play around with the software and sequences without a device connected.

## **User Interface:**

- **Enable Tooltips:** Tooltips are popup messages when hovering over certain elements. They explain what the element does.
- **Language:** Select a language from the drop down, the software will automatically switch to that language. Note: not yet functional. Spanish will come soon. Other languages may follow.
- **Reset Window Size:** NLED Aurora Control software is vector based and fully re-sizable, either grab the window edge and drag with your mouse. Normal 4:3 resolution, expanding the window only expands the Graphic tab and Timeline tab workspaces. Native size is 1024x768, if the monitor supports less than 768 pixels, the software will scale down to fit.

## **Device Connection:**

- **Automatic Device Connection:** If enabled, it automatically connects the previously successful serial port when the software starts.
- **Automatic Device Configurations Download:** If enabled, when a device successfully connects it automatically downloads the device's configuration settings and updated the configuration modules on the Hardware tab.

## **Documentation:**

- **Open Manual:** Opens the manual(this document) using the default PDF reader.
- **Contact Support:** Opens the default browser to NLED contact page.  
<https://www.NLEDshop.com/contact>
- **Video Tutorials:** Opens a default browser to NLED Aurora tutorial videos portal.

## **Version Status:**

When the software starts it contacts the NLED server to retrieve a file with the latest version information for the Aurora software and for device updates. If this fails, a notice will be displayed, check internet connection and firewall status. If it succeeds, it will indicate if the software is up to date, or if there is an available update.

Technical Note:



## Graphic Tab:

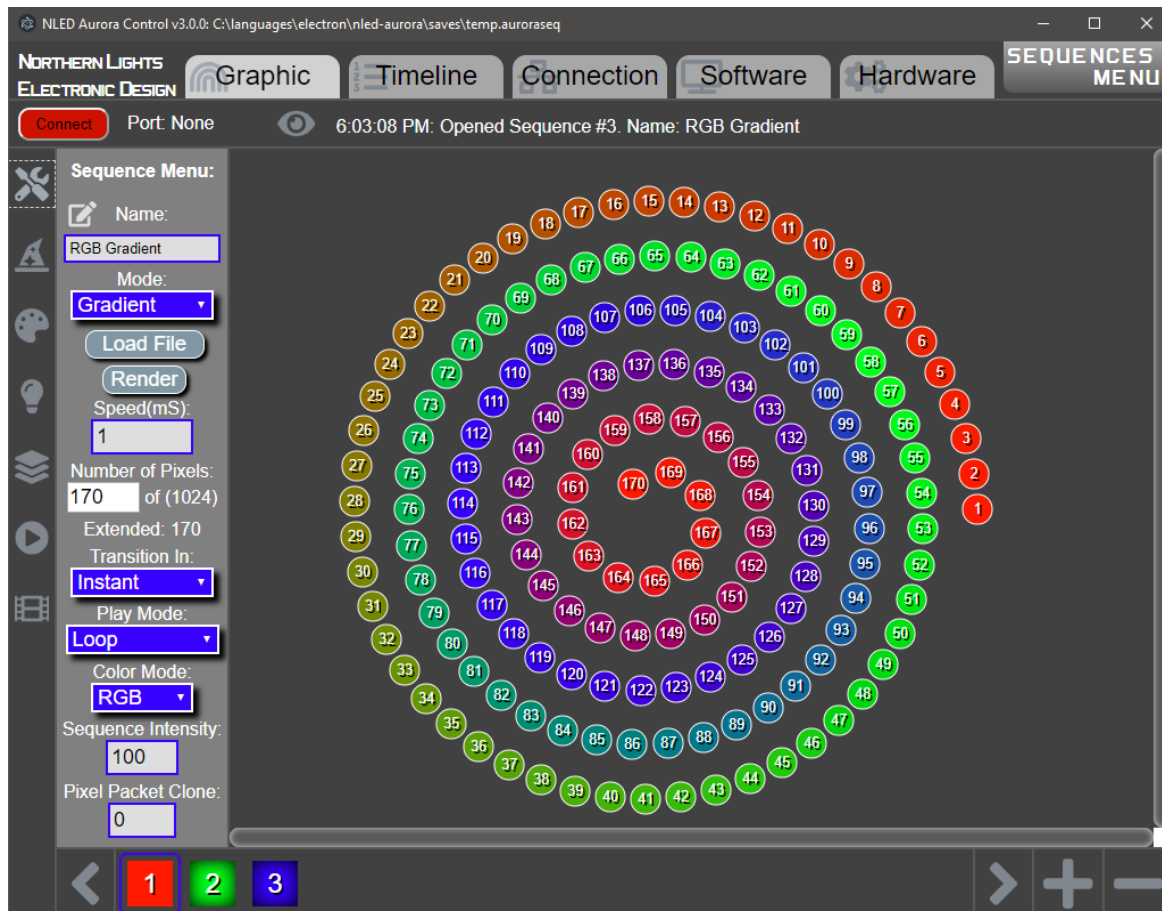
This tab shows the color sequence by displaying Pixel Icons that represent individually controllable pixels or LEDs for the project. The Graphic layout is setup using the left side tool menu, under the 'Pixel Icon Tools'. This is used to create a graphical representation of the project, defining the layout and positions of all the pixels(LEDs). The graphical representation makes it easier and more intuitive to create Color Sequences.

**Usage Instructions:** Start with the 'Pixel Icon Menu', create a Graphic layout using the instructions found in the Tools section of this manual, and by viewing the tutorial videos. Then go to the 'Sequences Menu' and select a mode, then number of pixels. Note the number of pixels should be the same as the number of defined Pixel Icons set in the 'Pixel Icon Menu'. Once setup, click a pixel icon to open the color picker, then select a color to set that pixel to.

To add or remove frames, use the Frame buttons at the bottom. See section for details.

**Pixel Icon Colors:** In the sequence modes Fade, Gradient, and Technical the pixel icons display the color of the Start Values, not the frame color. In sequence mode Instant, there are Start Values, but the pixel icons show the color for the frame. In sequence modes File and POV, the pixel icons show the frame color, as there are no Start Values. The List sequence mode does not use the Graphic tab or layout. Use the Timeline tab.

**Workspace:** Is the area where the pixel icons are displayed, this area of the window resizes and can be made smaller or larger to fit your monitor. The right and bottom scroll bars can be used to scroll if the workspace is too small.



(Graphic tab, "Spiral" layout shape, with 170 pixels)



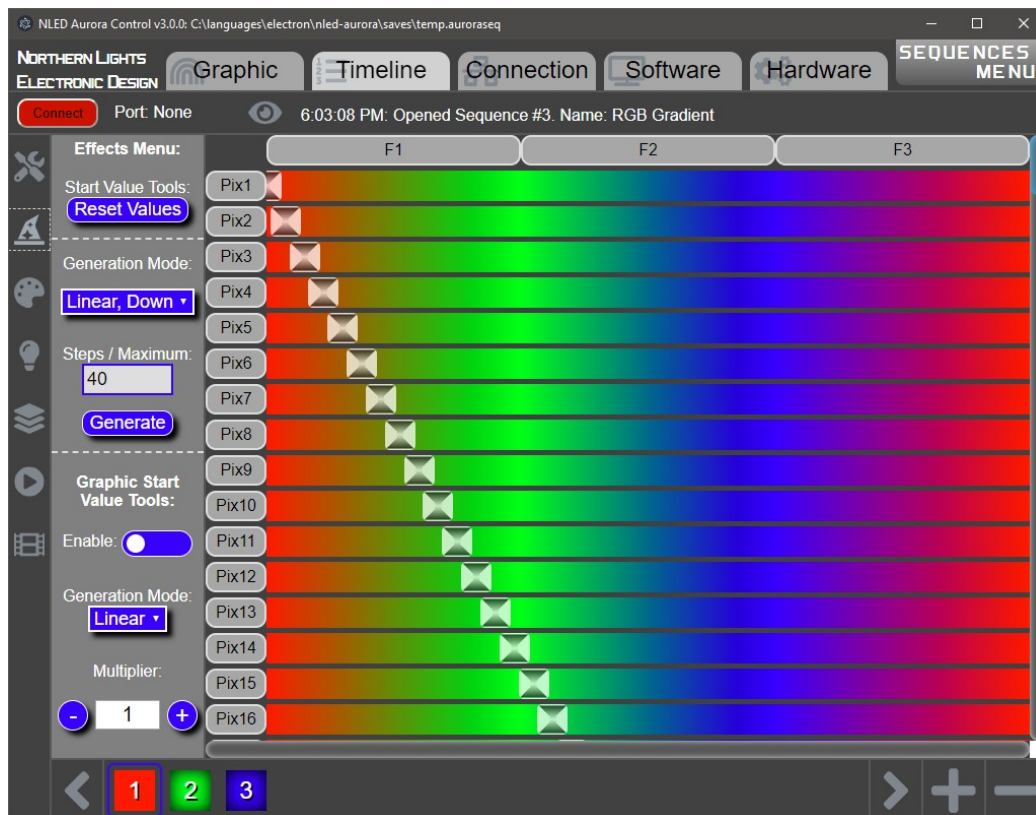
## Timeline Tab:

Another way to view and make changes to the Color Sequence. Each pixel is displayed as a row, the rows are divided into Frames, indicated with the labeled buttons at the top. Each frame of each pixel create a Cell that can be clicked to open the color picker.

**Usage Instructions:** The timeline is divided into rows and frames. Each pixel is a row, frames are columns. Every row is divided by columns to make a Cell. Each cell represents a color for a pixel in that frame. Click a Cell will open the color picker and once selected the cell will change to that color. Clicking the top Frame buttons(F1,F2, etc) will open the color picker and the selection will be applied to all pixels for that frame. Click the the row buttons(Pix1, Pix2, etc) will open the color picker and the selection will be applied to that pixel in every frame.

To add or remove frames, use the Frame buttons at the bottom. See section for details.

**Start Value Indicators:** Each color channel row has a Start Value Indicator, which is a hour-glass shaped icon in a grey box. They can be adjusted by clicking and dragging to alter the starting position for that pixel. Only from the Timeline tab can the start values be adjusted manually. The tools on the 'Effects Menu' can be used to set the Start Values using various functions and methods. Start Value tools can be used from either the Graphic or Timeline tabs. Changing the pixel colors can affect the Start Values, so it is recommended to choose all colors before applying Start Values.



(Timeline Tab, displaying same sequence as previous Graphic tab screen shot)

## **Connection Tab:**

This tab is used to interface with the connected device. There are several connection functions that are accessed from this tab.

## **Sequence Index:**

Located on the right side, the Sequence Index is used to create a list of sequences the user wants to load onto a controller. The order they appear on the list is the order they can be selected on the device using features like a button or through Aurora commands.

- Add A Sequence button(s) opens the sequence selection menu. And inserts the selected sequence into the position relative to the button.
- In a sequence tile, the link icon opens the sequence selection menu, and replaces the index slot with the selected sequence.
- In a sequence tile, the trash icon deletes the sequence in the index slot, and shifts all lower sequences upwards.
- The sequence tile can be dragged and dropped into other sequence tiles to re-arrange the index order.

## **Hardware Preview:**

This feature allows a sequence to be quickly uploaded and viewed on your project/LEDs. Click the Hardware Preview tile to open the sequence selection menu. Once selected the sequence will be uploaded to the connected device and it will start playing. There is a limit to the memory size of sequences that Hardware Preview supports. Not all sequence modes are supported.

## **Live Control Menu:**

USB Live Control allows the output channels to be controlled over a data(USB as emulated Serial or Serial adapters such as FTDI, or regular COM ports) connection. Data is sent in packets, with a byte for each output channel in 8-bit mode(0-255), or 2 bytes per channel in 16-bit mode(0-65,535), in 16-bit mode the MSB is first. There are two methods in the Aurora software, a slider option and a color picker option.

The Live Control features can be used by third party and external programs, see GitHub for code examples. And the NLED Aurora command chart for additional details.

## **Stand-Alone Control Menu:**

In addition to direct control of the outputs, the standalone sequences that are already uploaded to the controller can also be controlled. There is a graphical interface with some of the available commands. Please see NLED Aurora command chart for details.

## **Gamma Correction Menu:**

Aurora compatible devices allow the optional use of a gamma correction or dot correction tables. The gamma correction values are applied to the final output values and affect channel intensity. Gamma correction is a complicated subject not covered here. There is an option to use a pre-defined table of values, or the user can create their own gamma correction file(see 'assets' folder for files and details), the tables are uploaded and stored on the controller. In order to utilize the gamma tables, the user must also select the Gamma Correction enabled option in the device Configurations Settings.

Note: Some devices support gamma correction but do not use tables, so the user can not edit the gamma correction profile, see device datasheet for specifics. Contact if you require a special formula.

## **Upload Sequences & Index:**

Uploads Sequence Index and all the indexed Sequences to the device. The Sequence Index must be created before uploading. All previous sequence data on the device will be erased, allow several seconds for this to complete. A progress bar shows the progress of the upload.

## **Download Sequences From Device:**

Only works with devices running version 3 firmware. This feature completely new and may have bugs or issues. Downloads the index and color sequences stored on the connected device and loads them into the software. This will remove all the color sequences and index that is currently loaded into software. The downloaded color sequences will then be created in software and the index will be populated. The color sequence name is not stored on the device and each sequence will be assigned a placeholder name.

## **Idle Sequence:**

Click this tile opens the sequence selection menu. Select a sequence to indicate it as the Idle Sequence. The idle sequence is used with some features, and not all devices support or utilize it. In addition to selecting the idle sequence, the Configuration Settings must also be setup to utilize the feature. If no sequence is indicated, the sequence in Index slot #1 is used.

## **Global Intensity:**

When uploading the Sequence index and color sequences, there are a few options to adjust the final intensity or dimming value to the color sequences. The intensity is applied to the color sequences as they are sent to the controller, and once loaded to the controller the intensity can not be altered. This is the fastest and most accurate way to apply a dimming value to color sequences. This is applied on top of the Per Sequence intensity option, that is found on the tool menu. Both Global Intensity and Per Sequence intensity are applied to the sequences when they are uploaded. Device side dimming is separate and is in addition to the software set intensity.

## **Device Information:**

Shows some information on the attached device(or software emulated if no device is connected). Lists the supported number of pixels for the 3 available color modes. Mono(single color LEDs), RGB, and RGBW.

If a device supports, as an example, 768 channels. It would support, 768 single color LEDs, 256 RGB LEDs, and 192 RGBW LEDs. When uploading color sequence(s) if the sequence specifies more pixels than the device supports, it will modify the data. Look for messages in the Status Log for details.

## **Frame Buttons:**

**Accessed:** Graphic and Timeline tabs only.

**Usage Instructions:** These are the numbered icons along the bottom of the window. And are used to select a Frame. Use the + and – buttons to add or remove frames. Use the < > buttons to view more frame buttons, or mouse wheel over the frame button area to scroll.

## **Sequences Menu:**

**Accessed:** Graphic and Timeline tabs only.

**Usage Instructions:** Click the button(in the upper right corner) to open the Color Sequences menu. This menu shows all the Color Sequences that are currently available. If none are shown or to create a new sequence, press the 'Create New Sequence' button. All new and copied Color Sequences are placed at the bottom of the list.

## **Status Bar:**

### **Message Log:**

Displays messages to the user, these will include instructions, status updates, errors, and general information the user should pay attention to. Click the eye icon in the status bar to open the message log, scroll to view messages. All messages are time stamped. When a new message is posted, the eye icon will pulse, indicating there is a new message logged.

### **Connection Info:**

This is the left side of the status bar, to the left of the eye icon and message log.

The button will be red and show 'Connect' if no device is connected. Clicking this button will run the auto-scan serial port connection feature. That feature automatically detects NLED devices connected to USB and attempts to connect to them.

The Port label indicates the current connection status or COM/serial port ID.

## Color Picker

This is the color selector also called the color picker. It is used to choose and select colors. This is a specialized and simplified color picker. It supports RGBW as separate colors and mono as single values.

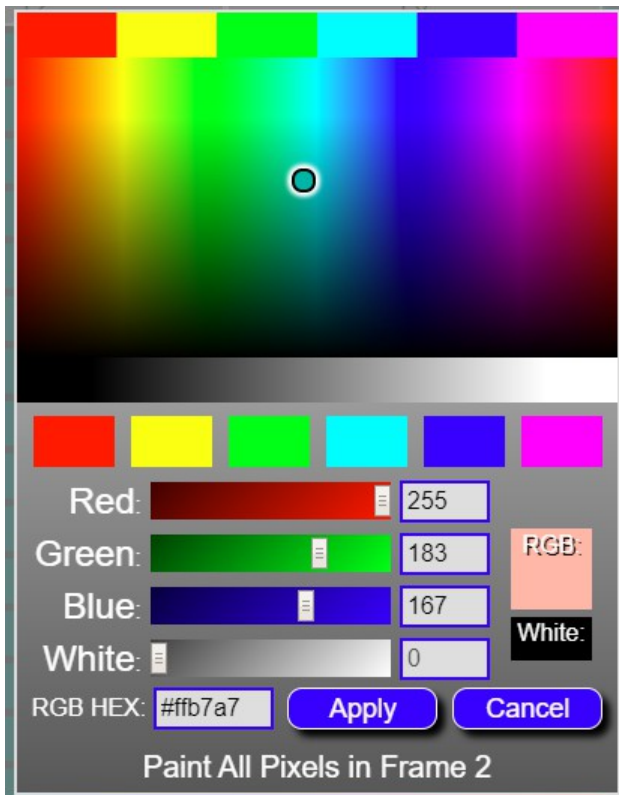
**Note:** In RGBW mode, the white elements can be used to set the white value. In Mono mode, only the white elements are used to set the value and only the black to white area of the color field is used. In RGB mode, the white elements will still be visible but can not be interacted with.

**Usage Instructions:** There are a several ways to open the color picker, depending on the action to be performed. Once opened, there are 4 methods of selecting a color.

1. The mouse can be used to select a color in the color field. It updates the other elements when a color is selected. Clicking and dragging will update as the mouse is dragged.
2. With the mouse, click on one of the palette colors under the color field to select it as a color. The palette shows the last 6 colors the user has selected.
3. Color value sliders can be adjusted to set the value for that color.
4. Color boxes numbers can be entered directly. 0-255 for 8-bit colors, and 0-65535 for 16-bit colors.
5. RGB HEX accepts standard HEX colors. RGB only, no Mono or RGBW support. Requires 6-digit HEX, does not support short hand 3-digit formats.

Once a color is selected, either press the Enter/Return key or press the 'Apply' button. To cancel the color selection, press Escape key or press the 'Cancel' button.

**Modes:** Along the bottom of the color picker window there will be a label stating the action of the color selection. This label will describe the action, the type of action is dependent on how it the color picker was triggered. Such as paint a single pixel icon or timeline Cell. Or running various paint functions.



## Tool Menu:

### Tools - Sequence Menu:

The primary place that the per sequence settings can be adjusted. Such as Sequence mode, Speed, Number of Pixels, Packet Cloning, Play modes, Transition modes.

- **Sequence Mode:** Selects the sequence mode, see first section for details on sequences.
- **Color Mode:** Single, RGB, or RGBW. Selects the per sequence type of pixel.
- **Speed:** Selects the speed the sequence plays. Each increment is equal to 1 millisecond on most devices. For Instants and similar, the Speed value is how long each frame is displayed on the pixels. For Fades(ramps) every iteration, the device will fade all color channels towards their next value. Fading/Ramping routine can take time on the device, depending on the amount of pixels and other settings, so lower values may not always be true to their speed value and will just run slower than specified.
- **Sequence Intensity:** This is the Per Sequence intensity feature, when the sequence is uploaded to the device the software will apply this intensity adjustment. See connection tab description for details. Applies to both Full Uploads and Hardware Preview uploads.
- **Number Of Pixels:** Selects the amount of channels the sequence will utilize, the number of channels is divided by the color mode(single, RGB, RGBW) and adjusted by options like Packet Cloning. Below under the “Extended Pixels” heading indicates how many Pixels with the current settings are utilized.
- **Packet Clone:** Some devices, mostly pixel controllers, allow the final output packet sent to the pixel strand to be duplicated, cloned, or otherwise sent more than once. This does not allow additional pixels to be controlled independently, but can allow a single longer strand of pixels to be controlled. Example: Strand of 100 pixels with clone value of 1, would make Pixel#1 and Pixel#101 act the same, Pixel#2 and Pixel#102 would act the same as well, etc down the strand to Pixel#200, which would act the same as Pixel#100. Changing the packet clone value will be indicated under the “Extended Pixels” heading below it.
- **Transition In:** On a per sequence basis the user can select a transition method that will be applied when the sequence starts(Transition Into). There are a few options, more to be added in the future.
- **Play Mode:** Selects the play mode of the sequence. The play mode action runs when the sequence completes one iteration. Using the play mode, dynamic user interaction functions can be achieved.
  - **Loop:** Plays sequence and restarts it seamlessly, loops forever until user changes the sequence.
  - **One-Shot Next:** Play sequence once then start the next sequence on the index.
  - **One-Shot Start:** Play sequence once than stop/pause on the starting values.
  - **One-Shot End:** Play sequence once and stop/pause on the end values.
  - **One-Shot Blank:** Play sequence once and blank/turn off all the outputs/pixels.
  - **One-Shot Idle:** Play sequence once, then start the Idle Sequence.
- **Load File:** Used for POV and File sequence modes, loads an external file into the software.
- **Render:** Usage TBD, will be for more advanced sequencing.
- **Extended(Number of Pixels):** Used in conjunction with Packet Clone feature. Displays the number of pixels that will be controlled with cloning applied.

## Tools - Effects Menu:

- **Reset Values:** Resets the start values to their default values.
- **Generation Mode:** Several options for generating Start Values. Used in conjunction with the 'Steps / Maximum' text box and 'Generate' button.
  - **Linear, Down:** Generates the Start Values offset from the first pixel up downwards.
  - **Random:** Randomizes the start values up to the specified value.
- **Steps / Maximum:** Accepts a value to be used when generating Start Values. Steps is used for Linear and other modes. If Steps is equal to the number of pixels in the sequence, the generated Start Values will create a seamless pattern if connected end to end. In Random generation mode, the box is used to indicate 0 to 100%, when generation is ran it randomizes the start values up to the indicated range Ex. If 50% is indicated, the Start Values generated will be offset up to 50%.
- **Generate Button:** After setting the mode and the steps/maximum, press this button to generate the Start Values. Check the Timeline tab to easily see the effect.
- **Graphic Start Value Tools:** These tools are used in conjunction with the Graphic tab and the Icon Layout Shapes.
- **Multiplier:** A higher value applies a greater effect to the tool usages. Value can be comparable to Steps/Maximum. A higher Multiplier values have a greater effect.
- **Generation Mode:** Selects the generation mode for the Graphic Start Value tool.
  - **Linear:** Generates start values based on mouse position and tool indicator. Applies values linearly.
  - **Radial:** Generates start values based on mouse position and tool indicator. Applies from center point out to the outer bounds.
- **Graphic Start Value Tools Enable:** After setting the Generation mode and multiplier. Move mouse to Graphic tab workspace, notice the cursor has changed. Click and hold the mouse button pressed in the desired center location, then drag the mouse around. The tool indicates the center point and outer points. When the tool is positioned, release the mouse to apply the affect. If it was not correct, use the tool again, or press CTRL+Z(CMD+Z) to undo the change.



## Tools - Paint Menu:

### Manual Paint:

This tool is used to 'paint' pixel icons on the Graphic tab, with a selectable brush size to paint multiple pixel icons at the same time. And to 'paint' single color cells on the Timeline tab.

- **Brush Size:** Sets the size of the paint brush. Only works on the Graphic tab.
- **Color(Manual Paint):** Square can be clicked to open the color picker to select a color for the manual paint tool. This does not paint or affect anything until the tool is used.
- **Manual Paint Enable:** Enables the tool, once enabled, the Graphic workspace will show the brush. Clicking on the workspace and dragging with the mouse will apply the Manual Paint color to the icons. On the Timeline tab, the cursor indicates the tool is enabled, click a cell to apply the Manual Paint color.

### Function Paint:

This tool is used to 'paint' the pixels by a function.

- **Function Mode:**
  - **Frame, All:** Paints the all the pixels in the currently selected frame.
  - **Frame, By Zone:** Paints all the pixels assigned to the currently viewed zone.
  - **Zone, All:** Paints all the pixels in all the frames for the currently viewed zone.
  - **Frame, Even:** Paints all the even numbered pixels in the currently selected frame.
  - **Frame, Odd:** Paints all the odd numbered pixels in the currently selected frame.
- **Color(Function Paint):** Square can be clicked to open the color picker to select a color for the manual paint tool. This does not paint or affect anything until the tool is used.
- **Apply Paint:** Runs the function mode and applies the Function Paint color.

## Tools – Playback Menu:

Tools for previewing the color sequence both on software and on hardware.

### Software Preview:

Simulates playing the Color Sequence in software. This is not very accurate of actual playback on the hardware device. All software preview will loop, even if the Color Sequence is has a different Play Mode.

**Play:** Starts the software preview, the playback can be watched on the Graphic tab or Timeline tab. Once it starts the next mouse click anywhere will stop the playback.

**Stop:** Stops the playback, or click anywhere to stop.

**Progress:** Shows the progress of the playback,

### Hardware Preview:

Uploads the Color Sequence to a connected hardware device. Once uploaded the Color Sequence will start playing normally. Device has to have already been setup and connected to before this works. And each device has a limit to how much memory can be uploaded for Hardware Previewing. If a Color Sequence is too large to preview, upload it normally using the Index.

**Upload:** Immediately uploads the Color Sequence for Hardware Previewing.

**Auto Hardware Preview:** Enabling this will upload the Color Sequence to the connected device whenever changes are made. This is throttled to only update every second at most. This is can also wear the device's internal flash memory, and this feature should be used sparingly.

## Tools - Pixel Icon Menu:

All the tools and options for setting up the Graphic pixel icon layouts. This is used to create a graphical representation of the physical layout of the project. All these settings work together to make the layout. The layout is used with Color Sequences, but the sequence data does not affect the layout. All these will only have an affect if viewing the Graphic tab. Once enabled, some tools will automatically disable if the Tool menu or tab is changed.

- **Pixel Icon Shape:** This is the shape of the icon. Square or round option.
- **Layout Shape:** This sets the shape of the layout.
  - **Round, Square, Line, Spiral:** No special actions.
  - **Map:** Also called a 'patch'. This loads an external coordinate file, the coordinates are used to place the pixel icons. Map files are created in NLED Patcher software, or other methods. See the 'example files' folder for sample files. Once Map is selected, use the 'Load File' button to choose the file.
  - **SVG/DXF:** Feature not yet implemented.
- **CCW/CW:** Clockwise and counter clockwise. Positions the pixel icons differently for each shape, usually by reversing the placement order.
- **Defined Icons:** Set the number of pixel icons to display. If more pixels are defined than a Color Sequence specifies(number of pixels), the icons will appear greyed out with a white dashed border. If fewer pixel icons are defined than the Color Sequence specifies, they will not be shown. It is recommended the number of defined icons is the same as the Color Sequences.
- **Size:** Sets the size of the pixel icons. All pixel icons are the same size, regardless of zone.
- **Density:** Sets the spacing between pixels. This value is dependent on the Layout Shape, it could specify the distance between pixels, or the radius, or other.
- **Advanced Layout Enable:** Enables advanced layout feature. It can be complicated to understand, but to simplify. It allows multiple shape layouts to be defined and built and used together as one layout. Shape layouts are added one by one, the user can define the shape, positioning, density, of the layout.
- **Advanced Icons:** Number of icons to add or preview during advanced layout building.
- **Assign Zone ID:** Sets the Zone ID number that the pixel icons will be assigned to when they are added.
- **Add To:** After the user has sized and positioned the shape layout in preview, pressing this button will add the preview layout to the advanced layout.
- **Reset:** Resets the layout, removes all the pixel icons. Including zone assignments and positions.
- **Shape Layout Preview:** Starts the Advanced Layout shape preview. This does not affect the layout until the shape is added(via Add To). Once enabled black icons with red border will appear in the work space. Adjust the 'Advanced Icons' value and the other shape options. Use the mouse to position the shape by grabbing the center handle and dragging to position.
- **Manual Layout Place:** Allows the user to place the pixel icons with mouse clicks on the workspace. No other options are utilized. Click to place a pixel icon. Click and hold, then drag to move a pixel icon. Right click to delete a pixel icon, once deleted the next pixel icon placement will fill the slot of deleted icon(s).

## Tools – Zones Menu:

### Zones:

Used with advanced layout only. Zones allow pixels to be separated or grouped to make color sequence creation more intuitive.

- **Zone View:** Advanced layout only. Changes what zone is currently viewed. Zone #0 will show all pixel icons, pixel icons must be assigned to a zone to view it.
- **Clear Zones:** Clears all zone assignments by setting all pixel icons to zone #1.
- **Enable Manual Zone Assignment:** Enables the user to manually click pixel icons to assign them to the specified zone. Once enabled, set the Zone View to view the pixel icons, then click an icon to assign it the the Zone Assignment value.
- **Merge Zones:** This button when clicked will merge the pixel icons from the currently viewed zone, to the Zone Assignment number. All pixel icons assigned to the Zone View value, will merge into the Zone Assignment value.

### Graphic Layout Image:

Allows an image to be placed onto the Graphic workspace. This could be a picture of the project or some layout guide/reference. The image file path is saved with the Color Sequences, but not the image, the image must remain where it was loaded from. IE: the absolute file path to the image must not change.

- **Enable:** Enables the Graphic Layout Image feature. Once enabled use the rest of the options to set it up.
- **Load Image:** Opens the file dialog so an image file can be selected. Most image formats are compatible, may require some pre-processing to resize.
- **Reset:** Resets the current image's position and sizing.
- **Enable Positioning:** Allows the image to be moved and resized. Once enabled, the Graphic workspace will show handles for the center and corners of the image. Click and hold then drag to position the center point and corner positions. Once complete, disable positioning or hit Enter/Return.

### Workspace Grid:

Toggles the option to display a grid on the Graphic layout workspace. Makes it easier to manually place icons and other tasks.

## Tools – Frame Menu:

Allows data to be copied between frames and between Color Sequences. Does not resize or change the data.

- **Copy Frame:** Copies the currently selected frame's color data. The selected frame is indicated by the bottom frame bar, click a numbered icon to select the frame.
- **Paste Frame:** Pastes the previously copied frame color data to the currently selected frame.

## **Aurora Command Protocol:**

Aurora compatible controllers have a specialized command set that is used to control and command the controller from the Aurora software or from user created software applications. It is a simple character exchange protocol based on ASCII and 8-bit numbers. Many NLED controllers have USB compatibility, the USB drivers make it appear as a standard legacy serial or COM port to computer. Other controllers may require a USB to Serial Adapter(such an FTDI) or other form of TTL(5 volt) serial converter in order to interface with the NLED controller. Some NLED controllers can use TTL serial and USB interchangeably and transparently to computer side software. The feature is listed as “Serial Command Mode” and must be selected through hardware configurations, it may interfere with other data communication methods such as DMX or Serial, see device datasheet. Whether the device is connected over USB or serial, the command protocol works the same and is transparent to the controller and software.

Any software language that can communicate with serial ports can interface with Aurora controllers. The command protocol is also so simple that commands can be issued from a serial terminal like RealTerm or HyperTerm.

Details and specifics can be found in the separate document “nled-aurora-command-manual-v3.pdf”

Example software application utilizing Aurora commands and a Node.js Javascript library are also available.

## **Communication Hierarchy:**

A hardware device may have multiple communication methods, such as USB, DMX, serial, IR remote, etc. While many run concurrently(USB always runs if enabled) the other ones may share hardware or in/out connectors. So depending on user configuration settings some features may not be accessible.

Serial Command mode will disable all DMX in(reception) and out(master) communications, and also disables serial mode data reception. Serial mode is different from serial input that Serial Command Mode uses.

Master DMX mode will disable all DMX reception and serial mode reception.

If Infrared remote add on card is enabled, on most devices this disables other communications other than above.

If neither DMX master or Serial Command mode is set, then the autodetect(DMX or serial) feature can be enabled. Nothing will stop the user from setting, as an example, DMX master mode and autodetect DMX, but since DMX master is enabled the device will not be able to receive and autodetect DMX data.

Lower numbers override lower numbers when using the expansion header or serial header(on some devices)

The software will allow any combination of data reception modes to be enabled, but only one will function correctly.

### **Hierarchy: (Revamped in software version 2h and newer firmwares, automatically handled)**

1. Serial Command Mode
2. Master DMX transmission - non-pixel output based.
3. Infrared remote control - Add on card only, devices with native infrared do not apply.
4. DMX or serial auto-detect and reception.

## **Dimming / Intensity Options:**

There are a few different ways NLED controllers allow the user to control the overall output intensities, this can be applied to stand-alone sequences or data reception methods(DMX, Serial, USB).

**Software Side:** As described earlier in this manual, the software has two options to apply an intensity value to the stand-alone sequences. Any intensity options offered in software are applied to the stand-alone sequences during uploading to the controller. The software alters the sent data values to reflect the user's intensity settings, it does not affect the sequence data stored on the computer, only what is uploaded to the device. These intensity values can not be changed on the device the sequences would have to be re-uploaded. Offered as a global or on a per sequence basis.

**Device Side:** The controller also has options to adjust the output intensities of the outputs. Most controllers allow fine control(high resolution or steps) of the intensity. But some devices do not have fine control, and may only have 4 intensities(12.5%,25%,50%,100%). All device side intensity/dimming allows on-the-fly(immediately used application of the user indicated intensity. The intensity is used with stand-alone sequences, but may also be applied to data communication modes such as DMX, serial or USB. See datasheet or Contact Support for specifics.

## **Hot Keys:**

**CTRL+S:** Quick save to the "Save As" target file

**CTRL+Z:** Undo action - Note: does not work with all actions yet.

**CTRL+Y:** Redo action

**Escape:** Close overlay menus, color picker, and confirm boxes

**Enter/Return:** Apply color picker selection, close message terminal, end tool actions, enter values into text box

**Note:** On MacOS instead of CTRL the CMD key is used instead.

## **Mouse Actions:**

**Mouse Wheel:** Scroll various containers up and down.

**Mouse Wheel +Shift:** Scroll various containers side to side

## **Notes:**

Maximum Frames: 65,535 - Varies based on sequence mode and device

Maximum Stand-Alone Pixels: 1024, Varies by device

Maximum Data Control Channels: Varies by device

Maximum Index Sequences: 256

Maximum Sequences In Software: 256

## Quick Start Steps:

Basic instructions to get started with the software. Tutorial videos are also available at <https://www.NLEDshop.com/nledaurora>

### **Basic Steps:**

1. Download the software for your operating system.
2. The software is distributed as a ZIP. Once downloaded unzip the folder.
3. Extract the 'nled-aurora-v300' or similarly named folder to a location your computer that you would like to store the software at. There is no install.
4. Open the extracted folder and start the software.
5. On windows run 'nled-aurora.exe'. Other operating systems please see the software README for specific operating system instructions.
6. The software should now be open. On the first run it will show the README and EULA to the user. Click the X or press Escape key to close it.
7. Software is now ready to use. The following sections cover some of the possible next steps.

### **Connect Device:**

1. To connect to a NLED device, go to the hardware tab and press the 'Auto' button to automatically scan through all serial ports on the system. Careful if other serial devices are connected they may receive unexpected data.
2. If it does not connect you may have selected the wrong serial/COM port, wrong baud rate (baud rate does not matter for native USB devices). Or the device is not powered up. Double check your operating systems port listings to ensure the NLED device is listed. In windows this is the 'Device Manager'. For Windows a driver may need to be installed, this driver is available through windows update and may be automatically downloaded.
3. Once connected the software will automatically download the device's configuration settings. There is an option to enable or disable this feature on the Software tab.
4. Use other tutorials for more details. Such as loading a Color Sequence file (.auroraseq) or starting new.
5. It is recommended for new users to go to the software tab, then 'Load Sequence' button. The file dialog opens, navigate to the software directory /saves folder and find the .auroraseq file for your NLED device and open it.

### **Software Demonstration:** Recommended first time users.

1. Once the software is open. Go to the Software tab.
2. Find the "Software Demonstration" button and press it. Approve the confirmation.
3. That will load a sample Color Sequence file and show the user the Graphic tab.
4. The Graphic tab will already have a layout and show colored pixel icons.
5. In the upper right corner is the 'Sequences Menu' button. Click it to open the color sequence selection menu.
6. Scroll up and down to view some examples of Color Sequences. Select a color sequence to view it.
7. Use the Graphic tab and Timeline tab to explore and edit the Color Sequence.
8. Try out different Graphic layout shapes and setups on the Pixel Icon Menu tools.
9. With no device connected many functions on the Connect tab will have no effect. See previous section for connecting a device. The device that you connect may not be completely compatible with the Demonstration sequence file that was loaded.

## Glossary of Definitions:

**Color Sequence:** or just Sequence. A color pattern, contains all the data to control the LEDs. Or dataset(how the color data is stored) that creates colors, patterns, and sequences. Can be single color, RGB or RGBW, all are still color sequences.

**Channels:** A channel represents a single output on a controller or a single color of a pixel. An RGB pixel uses 3 channels, an RGBW pixel uses 4 channels.

**Color Channel:** Represents a single LED or pixel. That could be either single color, RGB, or RGBW(or RGB+U.V.) A Color Channel is seen as 1 or more Channels. A sequence set to RGB Pixel Data Type will use 3 Channels Color Channel. A LED Icon(on the Graphic Layout tab) or a row on the Timeline tab represent a Color Channel.

**Pixels:** Used to refer to a color channel or individually controllable node. A pixel can be single colored, RGB or RGBW. Each pixel is independently controllable. And may contain one or more physical LEDs in any arrangement.

**Frame:** The data stored in each Frame will be displayed on the outputs/pixels sequentially. A Frame can be thought of as a single frame of a video, it holds all the data to create those colors. The next frame will hold new colors. For fades, gradients, and combos, the start value can be adjusted to start different output channels in different frames, creating multicolor sequences with less creation effort and data space.

**DMX Reception:** Receive and utilize a DMX-512 signal

**Serial Reception:** Receive and utilize a standard 8-N-1 serial signal. At the user selectable baud rate.

**Index:** Contains a directory, list, or order of the color sequences that will be uploaded to the controller.

**Color Mode:** Indicates to the software and controller the LEDs that will be controlled are either a single color LED(like just blue), RGB, or RGBW(Any 4 colors)

**Pixel Icons:** Shown on the Graphic Layout tab in the workspace. They indicate a pixel or color channel that can be edited. Pixel Icons are the same as a row on the Timeline tab. But the user must manually select the frame using the buttons at the bottom of the workspace.

**Project:** Refers to the user's project and the LEDs that are used in it. Everybody's projects will be different, different layout of LEDs, different quantities of LEDs, different usages, different types of LEDs(single color, RGB, RGBW), and all sorts of other variations.

**Zone:** The software allows multiple LEDs in any order to be grouped together. Once assigned to a zone they can be viewed and acted/alterd upon on per zone basis. This feature was called 'grouping' in v1 and v2.

**Power Cycle:** Removing all power supply from the controller. Including USB and any power ran to the LEDs or pixels. To prevent USB lockup, disconnect software from the device before power cycling.

**Datasheet:** or Device Datasheet, each hardware device has a document that describes its features and their usages.

**Patch or Map File:** Defines to the software the physical positions and order(1<sup>st</sup> pixel, 2<sup>nd</sup> pixel, 3<sup>rd</sup> pixel etc) of the LEDs/Pixels.



**Device:** Refers to the hardware platform or controller.

**Packet Cloning:** For pixel controllers only, repeats the same pixel data in one packet, making longer strands of pixels.

## **Other Resources:**

For full list of Aurora commands for interfacing with NLED devices:  
Find in the software directory or on the webpage:  
[nled-aurora-command-manual.pdf](#)

Youtube Tutorial Videos:  
<https://www.youtube.com/c/NorthernLightsElectronicDesign>

NLED Aurora Control Webpage:  
<https://www.nledshop.com/nledaurora/>

NLED Support:  
<https://www.nledshop.com/contact/Support@NLEDshop.com>

Addressable Pixel Information:  
<https://www.nledshop.com/pixelchipsets/>  
<https://www.ledpixels.info/>

LED Project Tutorial and Information:  
<https://www.nledshop.com/projectguide/>