

# Northern Lights Electronic Design, LLC – NLED Aurora Control Software – v.2f

*Please also read the NLED Aurora Control Manual for definitions and more info.*

This document covers the NLED command protocol. These commands can be issued to compatible NLED controllers and devices to initiate functions. These functions include things like Sequence Change, Color Swap, Device Identification, and more. Native USB devices will accept commands over emulated USB serial port, the USB serial port can be accessed by any software or language that can access standards serial ports. Such as serial terminals, Processing, C languages, .NET, Java, etc. Some USB controllers offer the “Dual Command mode” hardware configuration, that allows the controller to accept commands over it's UART from devices such as an FTDI, ESP8266, X-Bee, or other serial based transceiver at any baud rate, but always 8-N-1.

## Sending Commands to a NLED Device:

**NOTE: Command requests are sent and received as ASCII characters. The command and data bytes are sent as numbers(8-bit).**

### To Request a Command:

Host Sends (ASCII Characters):	“NLED11”	As Hex: 0x4E -> 0x4C -> 0x45 -> 0x44 -> 0x31 -> 0x31	
Device Responds(ASCII Characters):	“a9”	As Hex: 0x61 -> 0x39	As Decimal: 97 -> 57
Host Sends(ASCII Characters):	“nled99”	As Hex: 0x6E -> 0x6C -> 0x65 -> 0x64 -> 0x39 -> 0x39	
Device Responds(ASCII Characters):	“f0”	As Hex: 0x66 -> 0x30	As Decimal: 102 -> 48

Now the command request has been acknowledged by the device.

### To Send a Command Once Request is Acknowledged:

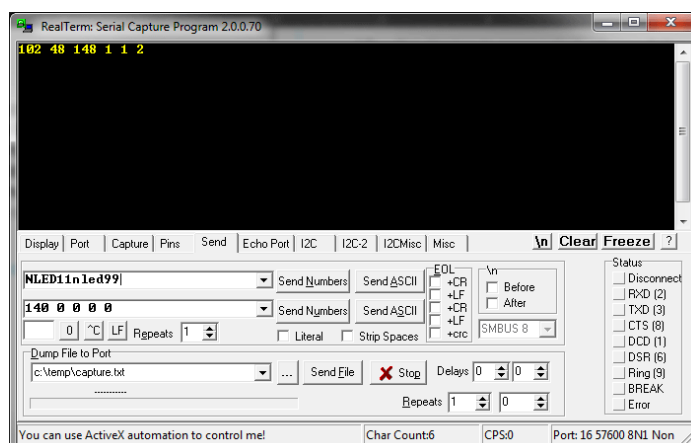
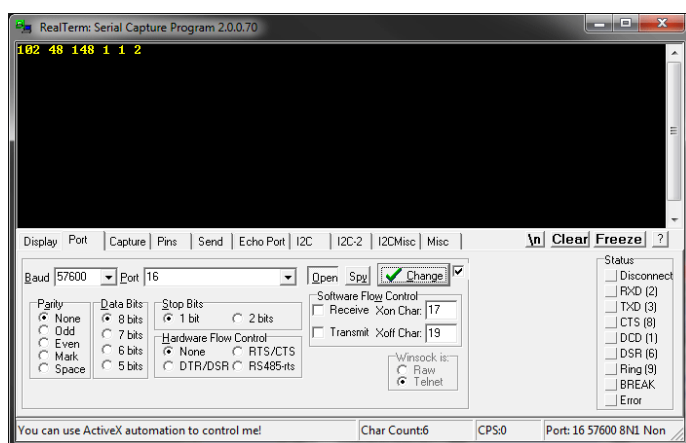
Host Sends(As Numbers): Command ID(Byte) → Data1(Byte) → Data2(Byte) → Data3(Byte) → Data4(Byte)

### Command Reception Acknowledge:

After the device receives the command it will respond as ASCII characters “cmd” then as numbers: 0 -> Issued Command ID Number

**Examples:** Contact [Support@NLEDshop.com](mailto:Support@NLEDshop.com) for assistance.

Sample code with command examples can be found at: <https://github.com/NLED/aurora-interface-example>



### Optional Manual Serial Terminal Command Issuing:

1. Open your serial terminal software of choice.
2. Open the device's serial port(or FTDI or similar serial port), USB devices accept any baud rate. Serial devices require the correct baud rate to be selected. Other settings are usually default, 8-N-1
3. Prepare the command request string. Waiting for the device responses is not necessary. Sending “NLED11nled99” as ASCII characters is acceptable to request a command.
4. The device will respond as ASCII “a9” & “f0”, the device is now waiting for the command bytes.
5. Send as Numbers the: Command ID followed by 4 data bytes. See later pages for command ID and data values.

<b>Command Name:</b>	<b>Command ID:</b>
Data Dump	3
Connect Device	4
Set Pixel Packet Clone Value	10
Device Output Dimming	15
Bulk Live Control - Hold Outputs	60
Blank Outputs, Set Live Option	61
Single Channel Live Control Update	62
Single Channel Live Control Release	63
Release All Live Control Channels	64
Dot Correction Upload	65
Report Channel Values	69
Speed Over Ride	70
Speed Decrease by 1 or Value	71
Speed Increase by 1 or Value	72
Toggle Pause Device	75
Color Swap/Shift	81
Instant Stepping	82
Fade Control	85
Select Sequence by ID Number	90
Sequence Down	91
Sequence Up	92
Hardware Preview Sequence Upload	99
Full Upload	100
Upload Configurations	101
Gamma Correction Upload	102
Request Configurations	120
Reset to Default Configurations Options	121
Device Bootloader Mode	140
External Device Bootloader Mode	141

**The following pages describe each command, the commands are in order of their ID#**

## **Command Name: Data Dump**

**Description:** Not for use by user. Do not issue.

**Usage:** Not Defined

**Command ID:** 3

**Data Byte 1:** Not Defined

**Data Byte 2:** Not Defined

**Data Byte 3:** Not Defined

**Data Byte 4:** Not Defined

---

## **Command Name: Connect Device**

**Description:**

Controller responds with its hardware/firmware details

**Usage:**

Responds with, HardwareID → Firmware Version → Firmware Revision -> Bootloader HardwareID -> Bootloader Version -> UserID Number

**Command ID:** 4

**Data Byte 1:** Not Defined

**Data Byte 2:** Not Defined

**Data Byte 3:** Not Defined

**Data Byte 4:** Not Defined

## **Command Name: Set Pixel Packet Clone Value**

### **Description:**

For pixel controllers only, allows the packet clone feature to be started by commands. Does not save to memory.

### **Usage:**

Only enabled on pixel controllers, sets packet clone value, could be overwritten by sequences changes, including linked sequence changes. Does not save.

**Command ID:** 10

**Data Byte 1:** Packet Clone Value(1-255), 0 = off

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Device Output Dimming**

### **Description:**

Indicates to the controller to apply intensity control to all outputs, with the option to use the intensity temporarily or to save it, once saved it will be applied to all compatible modes, including stand-alone.

### **Usage:**

Data1 indicates the intensity to apply to all the outputs. Not available on all devices.

**Command ID:** 15

**Data Byte 1:** 0 - 255 (equates to 0% - 100%)

**Data Byte 2:** 0 = temporary, 1 = Save Value

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Bulk Live Control - Hold Outputs**

### **Description:**

Starts direct live control of the outputs using bulk method. Once the command is initiated it the outputs will hold their values until updated with a full packet of bytes equal to Channel Amount

### **Usage:**

Once Initiated, send Channel Amount of bytes. Latches sent data values to outputs once Channel Amount has been received.

**Command ID:** 60

**Data Byte 1:** 1 for on, 0 for off

**Data Byte 2:** 1 for 16-bit Mode, 0 or any for 8-bit mode

**Data Byte 3:** Channel Amount MSB

**Data Byte 4:** Channel Amount LSB

---

## **Command Name: Blank Outputs, Set Live Option**

### **Description:**

Sets to Live Control mode and blanks(set to %0) the Outputs.

### **Usage:**

Blanks(0%) all outputs, optional enter Bulk Live Control mode or Stall/Pause

**Command ID:** 61

**Data Byte 1:** 1 for Bulk Live Control, 0 for Stall/Pause

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Single Channel Live Control Update**

### **Description:**

Sets a single channel to live control mode and specifies the output value. Can be used concurrently with stand-alone color sequences.

### **Usage:**

Sets a single output channel to the specified value, puts it into per channel live control mode if not already.

**Command ID:** 62

**Data Byte 1:** ChanMSB

**Data Byte 2:** ChanLSB

**Data Byte 3:** ValueMSB

**Data Byte 4:** ValueLSB

---

## **Command Name: Single Channel Live Control Release**

### **Description:**

Releases a single channel from live control mode back to default/stand-alone usage. Can be used concurrently with stand-alone color sequences.

### **Usage:**

Releases a single output channel from per channel live control.

**Command ID:** 63

**Data Byte 1:** ChanMSB

**Data Byte 2:** ChanLSB

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Release All Live Control Channels**

### **Description:**

Releases all output channels from live control mode. Returning them to default usage.

### **Usage:**

Releases all channels from per sequence live control.

**Command ID:** 64

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Dot Correction Upload**

### **Description:**

For Compatible Controllers, see hardware info for details

### **Usage:**

Send bytes equal to channel amount, values 0 – 63

**Command ID:** 65

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Release All Live Control Channels**

### **Description:**

Returns the output channel value(s), either a range or a single channel value. Max 255 bytes can be reported, if more are requested 0 will be returned. Returns 8-bit or 16-bit MSB first numbers

### **Usage:**

0 values in Data1 and Data2 will report all channel values up to MaxChanNumber, 0's in Data3 & Data4 will report back a single value indicated by Channel Number MSB & LSB

**Command ID:** 69

**Data Byte 1:** Channel Number MSB

**Data Byte 2:** Channel Number LSB

**Data Byte 3:** MaxChanNumber MSB

**Data Byte 4:** MaxChanNumber LSB

---

## **Command Name: Speed Over Ride**

### **Description:**

Alters the Speed for current stand-alone sequence Sent as Unsigned Integer.

### **Usage:**

Send an unsigned integer(0 to 65,535) to set the Speed for stand-alone sequences. Does not save, and a sequence change over rides.

**Command ID:** 70

**Data Byte 1:** New Speed MSB

**Data Byte 2:** New Speed LSB

**Data Byte 3:** 0

**Data Byte 4:** 0

---



## **Command Name: Speed Decrease by 1 or Value**

### **Description:**

Decrease the Speed by a single value, or up to 255. Affects current stand-alone sequence, does not save.

### **Usage:**

If Data1 is 0, it will subtract 1 from the speed, if its 1-255 it will subtract that value

**Command ID:** 71

**Data Byte 1:** 0 = Subtract 1, Or Subtract 1-255

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Speed Increase by 1 or Value**

### **Description:**

Increase the Speed by a single value, or up to 255. Affects current stand-alone sequence, does not save.

### **Usage:**

If Data1 is 0, it will add 1 to the speed, if its 1-255 it will add that value.

**Command ID:** 72

**Data Byte 1:** 0 = Add 1, Or Add 1-255

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## Command Name: Toggle Pause Device

### Description:

Toggles pausing of the current stand-alone sequence, with optional fade down to 0%

### Usage:

Each Command issued toggles Pause state

**Command ID:** 75

**Data Byte 1:** 0 to toggle, 1 to pause, 2 to play

**Data Byte 2:** 1=Fade Down all outputs to 0%, 0 = None Fade Down

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## Command Name: Color Swap/Shift

### Description:

Swaps the colors based on 6 methods(including unaltered) See documentation for details. Data 2 should be 0 to run the function, or to reset Color Swap send anything but 0 in Data 2

### Usage:

Send 0 to increment Color Swap Mode, or send 1 – 6 to set the mode, See image below for details.








**Command ID:** 81

**Data Byte 1:** 0 - 6, see image for ID number

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

NLED Aurora Control v.2a	
Color Swap Methods: By ID#	
0: RGB	
1: BRG	
2: GBR	
3: RBG	
4: BGR	
5: GRB	
6: GRBW	
<a href="http://www.NLEDshop.com/nledaurora">www.NLEDshop.com/nledaurora</a>	

---

## Command Name: Flash Stepping

### Description:

Allows commands to step through a Instant sequence frame by frame, either forwards or backwards.

### Usage:

First run CMD: 90, to load the Instant setting and prepare it for stepping. Then pause the sequence. Then use this command to step either forwards or backwards through the stand-alone Instant sequence.

**Command ID:** 82

**Data Byte 1:** 1 for Forward, 0 for Backward

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## Command Name: Flash Stepping

### Description:

Stalls a Fade sequence and waits for command to allow it to cycle a variable amount of times. Variable should be a unsigned integer. Sending 200 will let each channel cycle normally 200 times. It takes 255 x (Amount Of Frames) for a full rotation of the setting's colors. No Linked sequences are supported.

### Usage:

First run CMD: 90, to load the Fade sequence and prepare it for Fade Control by Pausing it. Then issue this command to to fade the sequence forwards a defined amount of steps.

**Command ID:** 85

**Data Byte 1:** Amount MSB

**Data Byte 2:** Amount LSB

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Select Sequence by ID Number**

### **Description:**

Selects a stand-alone Sequence by ID number. The ID number is the the sequence's position in the Index.

### **Usage:**

Loads a sequence by ID indexed ID number, with mode. Start playing or start paused. Data2 with a value of 1 will start the Idle Sequence, otherwise send 0.

**Command ID:** 90

**Data Byte 1:** Sequence Number(0-255, base zero, means #0 is the first sequence)

**Data Byte 2:** 0 = Ignore, 1 = Idle Sequence

**Data Byte 3:** 1 for Pause, 0 for play

**Data Byte 4:** 0

---

## **Command Name: Sequence Down**

### **Description:**

Decrement Sequence, as if the button was pressed.

### **Usage:**

Send command, instantly changes sequence, saves to memory.

**Command ID:** 91

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Sequence Up**

### **Description:**

Increment Sequence, as if the button was pressed.

### **Usage:**

Send command, instantly changes sequence, saves to memory.

**Command ID:** 92

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Hardware Preview Sequence Upload**

### **Description:**

Uploads a single sequence to the controller for Hardware Previewing.

### **Usage:**

Not for user, details proprietary.

**Command ID:** 99

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Full Sequence and Index Upload**

### **Description:**

Uploads the index and all indexed color sequences.

### **Usage:**

Not for user, details proprietary.

**Command ID:** 100

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Upload Configurations**

### **Description:**

Uploads the index and all indexed color sequences.

### **Usage:**

Not for user, details proprietary.

**Command ID:** 101

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Gamma Correction Upload**

### **Description:**

Uploads the optional Gamma Correction/Dot Correction table values. Not available on all devices.

### **Usage:**

Depends on controller, contact for assistance. More details released in the future.

**Command ID:** 102

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## **Command Name: Request Configurations**

### **Description:**

Asks controller to send it's current configuration flags. More info available in the future.

### **Usage:**

Responds with the 16 bits of device configuration flags. Sent as two 8-bit numbers, MSB first.

**Command ID:** 120

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## Command Name: Reset to Default Configurations Options

### Description:

Resets configuration bits and most configuration bytes to default or 0. This will remove any configuration options the user has applied to the device.

### Usage:

Instantly updates to device's configurations flags and bytes to default

**Command ID:** 121

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

## Command Name: Enter Bootloader Mode

### Description:

Enters device into bootloader mode, will need to close serial/USB port connection and open the separate bootloader software. Note: After bootloading some devices may re-enter bootloader mode when reset, if your device keeps entering bootloader mode after bootloading new firmware, power cycle the device.

### Usage:

Immediately after issuing command the controller will enter bootloader mode. USB connection will be dropped or stalled.

**Command ID:** 140

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---



## Command Name: External Device Bootloader Mode

### Description:

For compatible devices with onboard modules or secondary microcontrollers. This command enters the device into transparent bridge serial mode which allows other devices to be bootloaded through the USB connection. Used for ESP WiFi modules, more function to be added in the future.

### Usage:

After issuing the command the Aurora device will enter a bridge mode. Disconnect from the Aurora USB port and open the third-party bootloading software for the external device. Such as NodeMCU flasher. Set it up and begin the flashing process. Once complete unplug the controller's USB port, and

**Command ID:** 141

**Data Byte 1:** 0

**Data Byte 2:** 0

**Data Byte 3:** 0

**Data Byte 4:** 0

---

Contact [Support@NLEDshop.com](mailto:Support@NLEDshop.com) for assistance.