



## **LanBox & LCedit+ Manual Version 4.01**

Version 4.01 changes:  
Added MIDI Program Change section

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# 1 Introduction

## Safety instructions

- Only use the power supply supplied with your LanBox. If your power supply is defective, a replacement can be ordered at LanBox Products.
- Do not use the LanBox at temperatures above 40° Celsius. This could damage the circuitry.
- Never suspend the LanBox by its cable connections. When suspending the LanBox, make use of appropriate equipment and use a safety steel.

## About this document

This document is intended as a manual for the LCedit+ software in combination with the LanBox. It is specifically written for the LanBox-LCX, but can also be used for the LanBox-LC, LC+, LCE and LCM. Although we have taken the utmost care to make this manual as complete as possible, due to the extensive range of possibilities of the LanBox, some features may be overlooked. Do not hesitate to contact us whenever you stumble upon anything not described (fully) by this manual. We are happy to assist you and, when necessary, update this document.

## About the LanBox

The LanBox-LCX is a powerful and multipurpose box. It has Ethernet, USB, MIDI in and out, DMX out, DMX in, eight analog inputs and eight digital outputs. All these inputs and outputs can be programmed to do anything: use an analogue fader to fade lights, control light cues through DMX, use Art-Net over Ethernet to start eight iPods using the digital outputs as rs232 ports or use the DMX input to send MIDI messages. It is all possible and most importantly: it will operate without a computer, reliable and for many years. This manual will show you how to set up the LanBox to access all these functions, making use of the LCedit+ software.

## In- and Outputs

The LanBox has the following in- and outputs:

Front:

- A: DMX-512 in and out
- B: MIDI in and out
- C: 10bit Ethernet port
- D: UDB Type B connector

Rear:

- E: DC37s D-sub connector
- F: Power supply connector



Image 1: The LanBox-LCX Front Panel

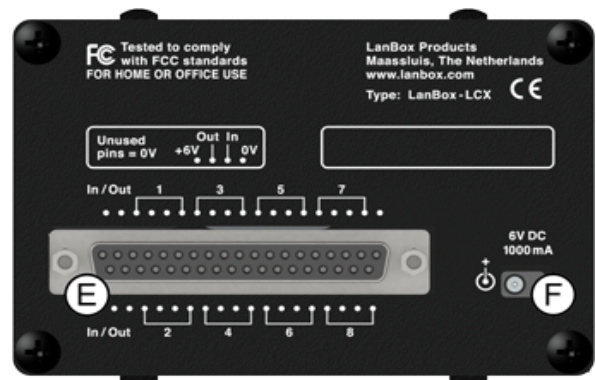


Image 2: LanBox-LCX rear panel

## About LCedit+

LCedit+ is the software suite specifically written to set up and control the LanBox. All the actual processing is done by the LanBox, LCedit+ is nothing more than an interface to access the LanBox. This is why LCedit+ will only work properly when connected to a LanBox.

LCedit+ is written in such a way that it is backwards compatible with every LanBox ever made, but all features will only be accessible when using a LanBox-LCX. LCedit+ runs under Microsoft Windows or Apple OS X (use versions up to 3.5 to use on PowerPC, use versions from 3.5.2 when using OS X 10.7 (Lion) and higher).

Although there will be some small cosmetic differences between different operating systems, LCedit+ should work exactly the same on either system. Project and Library files are readily exchangeable between operating systems.

## System requirements

### PC

Processor: Intel Pentium or higher  
Operating system: Microsoft Windows XP or higher  
Screen Resolution: Minimal of 1024x768 recommended  
USB port or 10/100BT Ethernet connection.

### Apple Macintosh

Processor: Any Intel or PowerPC (use LCedit+ version 3.5 or lower when using PPC)  
Operating System: OS X 10.4 (Tiger) or higher. Use LCedit 3.5.2 or higher with OS X 10.7 (Lion)  
Screen Resolution: Minimal of 1024x768 recommended  
USB port or 10/100BT Ethernet connection.

## Setup and Install

### Installing LCedit+

To install LCedit+, copy the software files (unpack when you are using a zipped folder!) to your computer. For easy access, move the LCedit+ folder to your applications (OS X) or Program Files (Windows). Simply start the application, no further installation is required.

Note: When opening LCedit+ in OS X, no main window will be visible when opening LCedit+ until you open a new project, only the menu bar will be visible.

### USB setup

#### OS X:

The LanBox will be automatically detected and installed as an USB modem. If asked to set up the interface, select Cancel.

#### Windows:

In Windows you will have to install the CDS USB modem driver the first time you connect the LanBox. This is supplied with the LCedit+ software and available for download on [www.lanbox.com](http://www.lanbox.com). After connecting the LanBox, find it in your device list. Select hardware → properties → drivers and install the CDS UDB Modem driver (be sure to tell Windows to look in the LCedit+ folder). Windows will automatically assign a COM port to the LanBox.

Note: LCedit+ is only able to detect COM ports 1 through 8. Sometimes Windows assigns a higher COM port number to the LanBox. If this happens, open the device settings, go to the advanced COM port settings and select a COM port number in the range of 1 through 8.

## Network setup

Connect the LanBox either directly to your computer or to your local network. The LanBox default network settings are:

IP address:	192.168.1.77
Subnet Mask:	255.255.255.0
Standard Gateway:	192.168.1.1
Password:	777

If you are not familiar with computer networks, the consequences of these setting are as follows: the Subnet Mask determines which IP addresses the LanBox will be able to communicate with. In this case, the 255s mean numbers identical to your IP address, the 0 means any number. So in this case the LanBox will be able to communicate with all computers and devices with an IP address of 192.168.1.x.

If you connect the LanBox directly to your computer, adjust your network settings to match the LanBox's settings (so, for example an IP address of 192.168.1.100 and a network mask of 255.255.255.0). If you are connected to a local network, set the LanBox to match your local network settings (so if, for example, your router has an IP address of 192.168.10.1, you're computer will probably have an IP address of 192.168.10.x and the LanBox should be set to a free address in the same IP range).

## Configuring the interface

When opening a new project (File → New Project...), the 'Configure Interface' window will appear (Image 3). In this window you can tell LCedit+ which LanBox you want to connect to and how you want to connect to it. Use a serial connection if you have connected the LanBox using USB, choose the TCP/IP connection if your LanBox is connected with a network cable.

**Note:** the AppleTalk and MIDI tabs are still present due to legacy reasons, but cannot be used in Windows XP and higher or Mac OS X.

When using the serial connection, select the port of the LanBox (COM x in Windows, usbmodemxxx in OS X). When using an Ethernet connection, type the LanBox IP Address in the text box. The default is 192.168.1.77. If you don't want to re-type the password every time you reconnect to the LanBox, you can check the 'Save Password' box. The default password is 777.

If you have multiple LanBoxes connected to your system, it is wise to give each connection a name. This can be done in the 'Name' text box.

The Connection Settings will be stored with your project and LCedit+ will automatically attempt to reconnect when you re-open a saved project.

**Note:** You can access the 'Configure Interface' window at any time by opening the Interfaces window (Window → Interfaces) and double-clicking the LanBox Interface of which you want to access the settings.

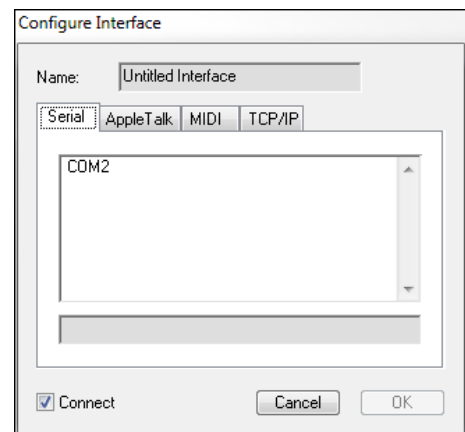


Image 3: Serial Set Up

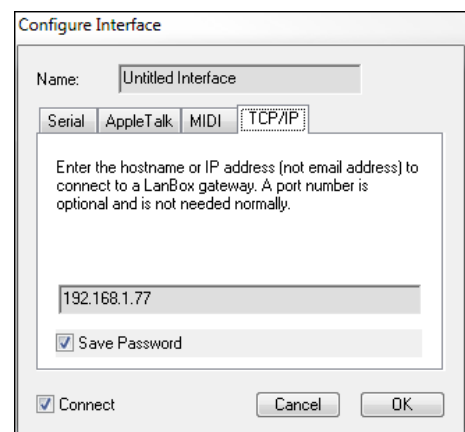


Image 4: TCP/IP Set Up

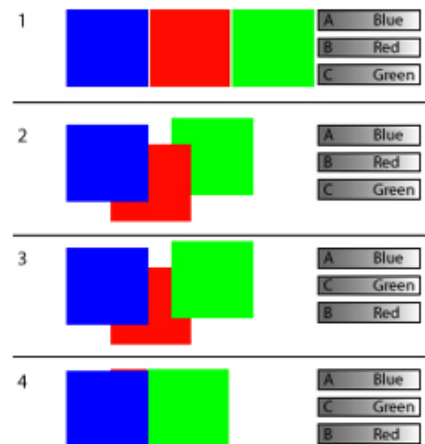
## 2 LanBox concepts

Before you start working with the LanBox, it is best to familiarize yourself with some of the inner workings of the LanBox. Although, in a lot of ways, the LanBox is quite similar to 'conventional' lighting controllers, some concepts are very different from what you may be used to.

### Layers

A unique property of the LanBox is that it works with Layers. Every Layer can run a Cue List and have a certain amount of active Channels. The Number and order of Layers is completely customizable up to a maximum of 31 Layers (except for the LanBox LC which has 8 fixed Layers). The way Layers are organized, how the Mixer settings are applied and which Channels are active in each Layer all contribute to the eventual output of the LanBox.

A reasonable analogy of how the LanBox Layers work is the way Layers work in most graphics software. If you look at Image 5, you can see several possible scenarios. Every Layer contains a square. Layer A has a blue square, Layer B a red square and C a green square. In the first situation, every Layer's square occupies different pixels, so the order of the Layers does not effect what you can actually see. Now, if you move the squares in such a way that they overlap (situation 2), the way the Layers are ordered does matter. Layer A obscures a bit of Layer B which in turn hides a bit of Layer C from view. If you change the order of the Layers in such a way that Layer B is the bottom Layer (situation 3), the red square is even more hidden, and, when we move the squares a bit, the red square even completely disappears (situation 4)!



**Image 5: The principle of layers**

Now, if you replace the pixels with Light Channels and think of the pixel color as the Channel value, you can see how the ordering of Layers can seriously influence the end values of the Light Channels. Luckily though, the LanBox has several ways to actually use this principle to your advantage, like Mixing Modes (what would happen if you would make the blue square 50% transparent?) and Channel Control (move the squares around, or change their shapes). More on this will be discussed in the section Channels and Layers on page 14 of this manual.

### Mixer Buffers and Channels

Although one DMX-512 universe can contain a maximum of 512 Light Channels, the LanBox has a potential of a lot more Channels, up to 3072 Channels in fact. This means that you have a lot of spare Channels to store and manipulate a whole lot of values which you don't want to output to your DMX line. You can copy incoming DMX values, UDP streams and analogue signals to any channel you like, and then use them the way you prefer. All these values are stored in the LanBox in so called Buffers.

Every active Layer has a Buffer, but so does the DMX In- and Output, the analogue Input and most importantly, the Mixer. The Mixer contains the values of all the LanBox Channel. When all calculations are done and all the Layers have been added up, these values are stored in the Mixer Buffer. After this, the LanBox copies the values that have to be sent over DMX, UDP, Art-Net etc. into the right Buffer and broadcasts these values. By default, the LanBox transmits its first 512 Channels over DMX, but this can easily be changed (see section Patching and Channel properties on page 44).

### Cues

Of course it is possible to change every Light Channel manually, but in the vast majority of cases, that is the last thing you would want (and, with current day intelligent Fixtures completely impossible). That is why most of the time you will be using Light Cues. A Cue automates the control of your lights using loops, fades, scenes, etc. The LanBox has the possibility to store up to 999 Cue Lists, each containing up to 99 steps. Once stored, each Cue List can be called in any Layer for play back.

One of the unique things about the LanBox is that you can not only store Channel values, Goto commands and fades in your Cues, it is also possible to program a lot of other actions into your Cues. Start another Cue List in another Layer, wait for a specific clock time or even trigger events using other Channels or Inputs as trigger. All these possibilities will be explored in the section Cue Lists on page 21.

## Saving your work

The LanBox is a Stand Alone Light Controller. This means that all the information it needs to run a show is stored in the LanBox. The LanBox has two types of memory, its 'nonvolatile' flash ROM and its 'volatile' RAM memory. The RAM memory is very quick in storing and querying data, but requires power to work (this is what the volatile means). That means that anything stored here will be lost when you power down the LanBox. To save your work, it will have to be copied to the flash ROM. This memory works a lot slower, but will never lose its data.

To save your work go to **Tools → Save LanBox Data** (Ctrl Shift + S / ⌘ ↑ + S ) in LCedit+. This will not only store all Cue Lists and settings, but will also store the current LanBox state (all Channel values, currently running Cue Lists, etc.).

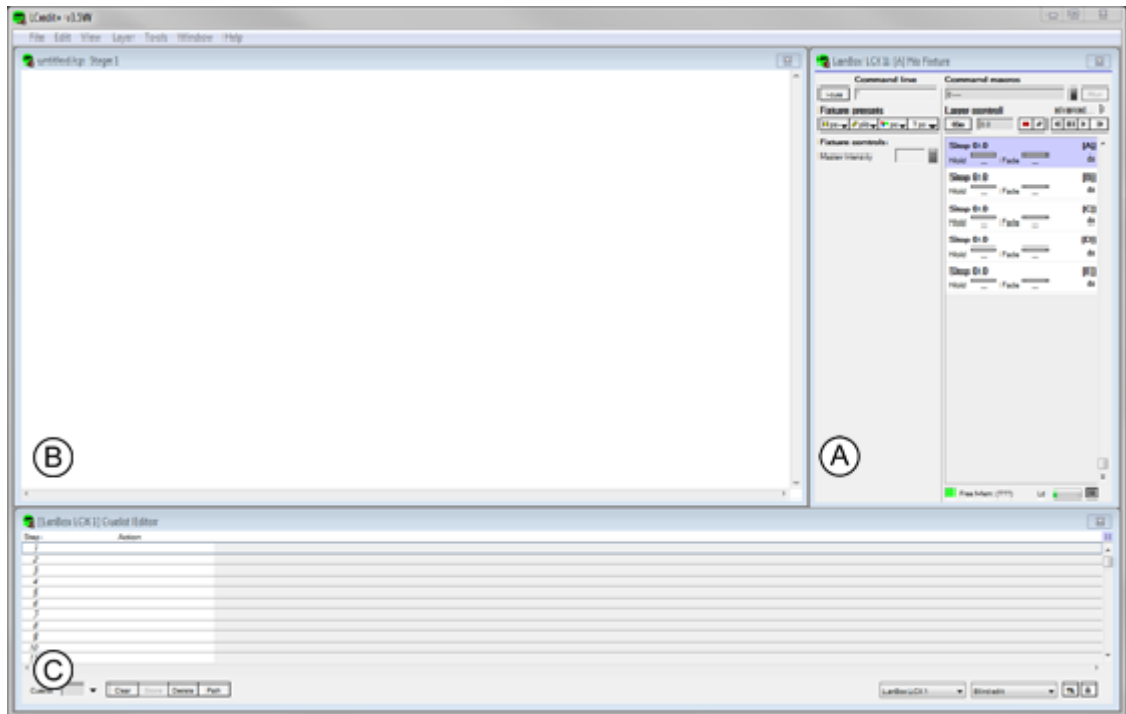
What isn't saved on the LanBox is your Stage Data. You will have to save this as a project on your computer (**File → Save or Save As...**, Ctrl + S / ⌘ + S). This is, together with the connection presets, the only thing that is saved on your computer! All other data is only saved on the LanBox. It is possible though to save the LanBox Data on your computer. You can copy all LanBox Data with the Backup function, discussed in the section Backup and Restore on page 61.

## On Boot

If the LanBox is supplied with power it will automatically boot (start up). The contents of the ROM will be copied to the RAM and the LanBox will continue doing exactly that what it was doing the moment you saved the LanBox Data. This means that you can set the LanBox up in such a way that it will automatically start a completely predictable sequence at start up.

### 3 LCedit+ overview

When you open LCedit+, you will see an empty screen. To start working with the LanBox, you will have to create a project. In the menu bar, select **File → New Project...** (Ctrl + N / ⌘ + N) and configure your LanBox connection as described in the section **Configuring the interface** on page 6.



**Image 6: The LCedit+ interface**

Now, LCedit+ will open the standard view (Image 6). On the right side you have the most important bit of LCedit+ interface, the Control Panel (A). The Control Panel is your main interface with the LanBox. It shows you which Layers are currently active, which Cue Lists are running, the memory and connection status of the LanBox and will give you the possibility to manipulate your Channels. More on this panel later. On the left you can see the Stage window (B). Here you can place your light Fixtures in order to make it possible for you to select them and give you feedback on every Fixture's status. At the bottom of the screen is the Cue List Editor (C). This window will be used to make and edit Cue Lists. These windows will be covered more thoroughly in the sections that cover the Stage and Cue Lists.

### The Control Panel

As said, the Control Panel (Image 7) is the main interface with the LanBox. It has the following elements:

#### Command Line

Used to type direct commands, discussed on page 34.

#### Fixture presets

Every Fixture can be given presets. These can be recalled here. Discussed on page 15.

#### Fixture controls

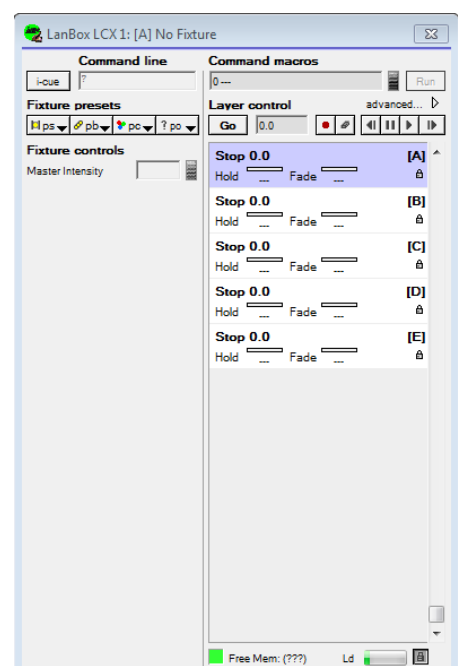
This section will show all the controls of your selected Fixture. Will be fully covered in section **Controlling your Fixtures**, page 14.

#### Command macros

Here you can record and run Command Macros. Discussed on page 34.

#### Layer Control

Control and manipulate Layers, load Cue Lists, etc. Will be covered in section **Layer Control** on page 16.



**Image 7: The Control Panel**

## 4 Setting up the Stage

In order to be able to select and control any Channels, you will have to add them to your stage first. The stage can be adjusted in such a way that it resembles the actual setup of your Fixtures. If needed, it is possible to have multiple stages with different elements of your set up. Add a Stage window by selecting **Window → New Stage Window** (Ctrl Shift Alt +T / ⌘ + T) in the menu bar. Setting up the stage can be a lot of work, but if you do it properly, it can spare you a lot of time later.

### Adding Fixtures

To add a Fixture to the stage, select the Stage Window and select **Edit → New Fixture...** (Ctrl + K / ⌘ + K) to open the Fixture Setup window. Here you can select your the Fixture you want to add to your stage. You can also set the Base Channel. As long as the DMX patch isn't changed, this will be identical to the DMX Base Address of the Fixture. If your Fixture is not listed, you can make a new one. How to do this is described in the section 9, Fixture Definitions. In the Fixture Setup window you can give your Fixture a name and a 'Short name'. The Short name is the name of the Fixture that will be displayed on the stage. If no Short name is given, the normal name will be displayed. It is smart to let your Fixture name end with a number (normally 1 for the first Fixture off a given type), as LCedit+ will automatically increment this number when duplicating items.

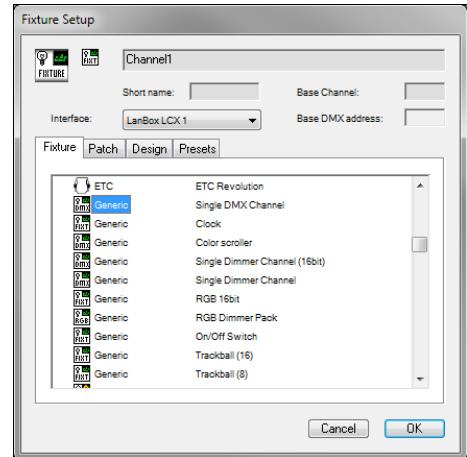


Image 8: The Fixture Setup window

When you want to place multiple identical Fixtures, you can duplicate a Fixture by Alt / ⌘ + dragging a Fixture, or by selecting one or more and selecting **Edit → Duplicate** (Ctrl + D / ⌘ + D). Duplicated items will automatically be numbered and given an sequential base channel. The items will be duplicated in the same order in which you have selected them, so if, for example, you select Fixtures 1 through 4 in reverse order, the duplicates will be numbered 8, 7, 6, 5 (Image 9).

After you have placed a Fixture, it is always possible to edit its properties by double clicking the Fixture or by selecting **Edit → Edit Item...** (Ctrl + E / ⌘ + E).

### View options

In the View Menu (Image 10), you can select different options to adjust the look and behavior of your Fixture icon:

**Small** reduces the size of your icon to 16x16 pixels (normal is 32x32 pixels).

**Icon Hidden** hides the Fixture icon and only shows the label.

**Label Hidden** hides the Fixture label and only shows the icon.

**Intensity Indicator** adds an Intensity bar next to the Fixture icon.

**Position Indicator** adds a horizontal and vertical slider to the icon to indicate movement (only works if the Fixture has a pan/tilt function).

**Color Indicator** replaces the Fixture icon with a colored square, indicating the RGB value of that Fixture. Only gives a color if the Fixture has a RGB function, will show a black to white gradient indicating the Fixture intensity.

**Show Numbering** toggles if the Fixture ID number (between the {}) is visible. The ID numbers will be used to quick select your Fixtures and groups with the Command Line Interface commands.

**Position Locked**, when on, disables the possibility to (accidentally) move the Fixture icon and disables the possibility to open a Fixtures properties by double-clicking.

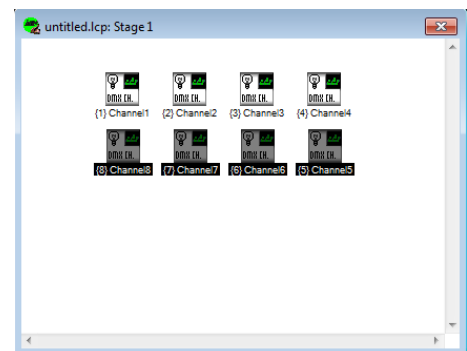


Image 9: Items duplicated in reverse order

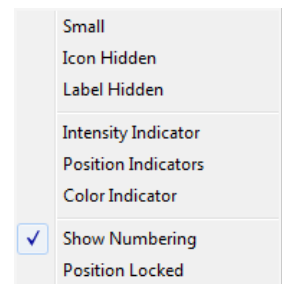


Image 10: The View Menu

## Changing your Fixture icon

In LCedit+ it is very easy to change the icons of your Fixtures on the stage. Simply select the Fixture(s) you want to change the icon of, open the Fixture setup of the selection by double clicking the Fixture or by selecting **Edit → Edit Item...** (Ctrl + E / ⌘ + E). Now, you can change either the small or large icon (or both) by selecting the icon and paste (using Ctrl/⌘ + C/V) another graphic into the icon square. This can be a self made graphic, but an image copied from your browser will work just as well. Note that the icons are quite small, so keep the picture simple and clear.

## Creating a background

In some situations, it might come in handy to add a background to your stage, like the floor plan of a venue or the trussing of your stage (Image 11). In order to do this, you will first have to have a background image. As you can't re-size the background image, be sure to make the image more or less the same size as your stage window (in pixels).

When you have your background image, open it in any preview or graphics software and copy its contents to the clipboard. Then, if you Ctrl + click (both on Mac and Windows) on the stage, you will see the Stage Background menu (Image 12). Here you can choose you paste you clipboard content onto the stage. As you can see, you can also copy, cut and clear the background here. If you want to move the background, hold down Ctrl + Alt (Windows) or Ctrl + ⌘ (Mac) to drag the background.

**Note:** it is only possible to copy the contents of a file to the stage, not the actual file itself.

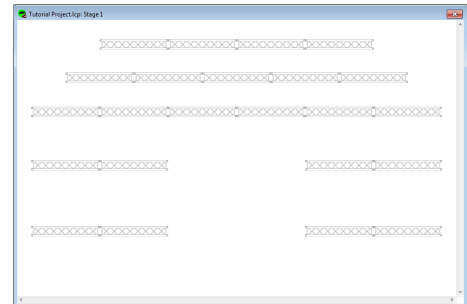


Image 11: A background picture in the stage

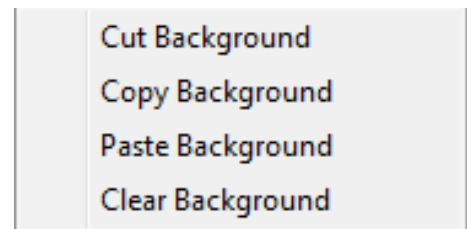


Image 12: The Stage Background Menu

## Grouping

To have quicker access to groups of Fixtures, you can make groups. This way you can select all Fixtures of the same type, all odd numbered Fixtures, or any other group at once. To make a group, select the Fixtures you want to group and select **Edit → Make Group...** (Ctrl Alt + M / ⌘ + M) to open the Group Setup Window (Image 13). Here, you can give your group a name, add and remove Fixtures, change the order of the Fixtures and change the icons in the same way you change a Fixture icon: select the icon and copy a graphic from the clipboard into it. The merge options determine how the Fixtures in your group will be represented in the Fixture Controls.

**Smart Merge** will merge all Fixture functions, but will also show the intensity channels for each Fixture separately.

**Concatenate** will not merge any Fixture function, but will show all channels of every Fixture in the Fixture Controls.

**Simple Merge** will merge all Fixture functions and will not show the separate intensity channels.

Now, if you fill your stage up with all your Fixtures, use the right view options and customize your icons and background, you can eventually end up with a Stage Window like in Image 14 on the next page.

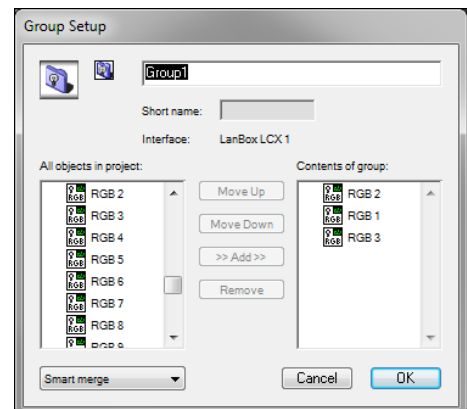


Image 13: The Group Setup Window

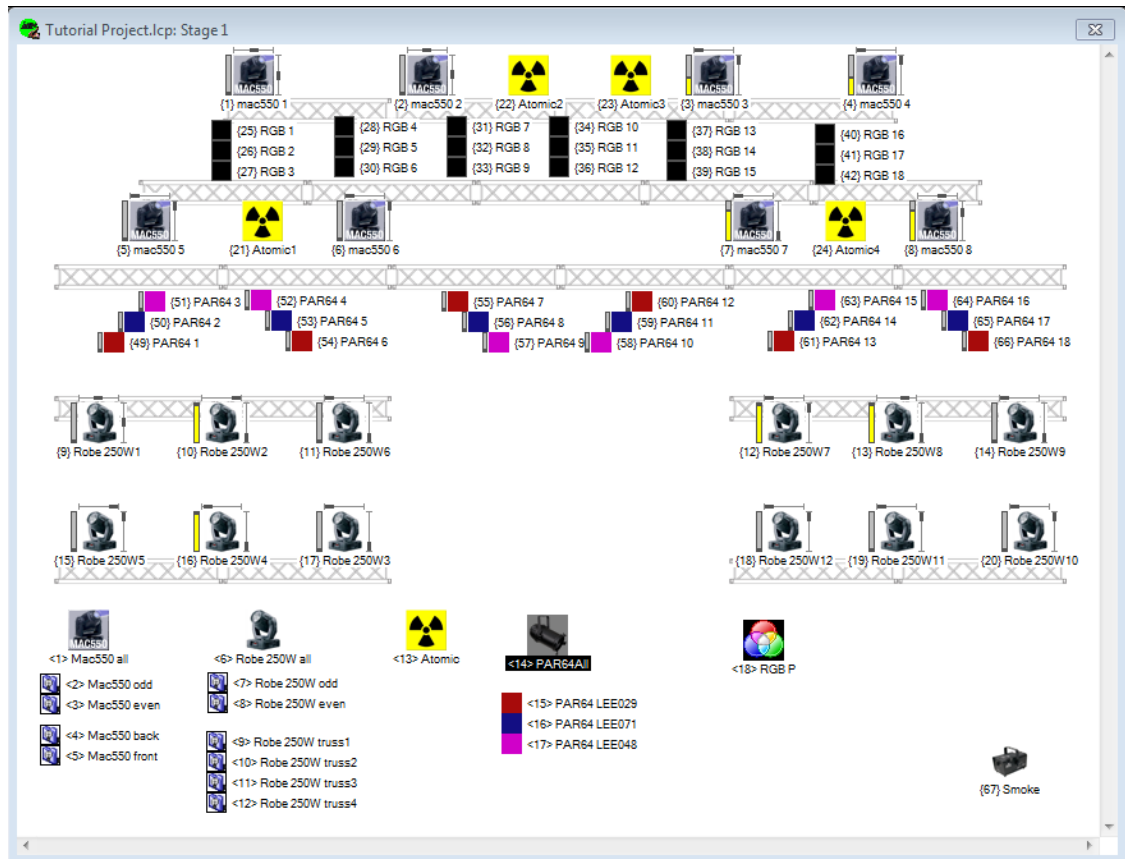


Image 14: A filled and customized Stage window

## An Example Show

### The Fixtures

Image 14 shows an example show we have made for this manual to cover the basic lighting functions. What we have done here is first add a background to the stage window. This background is simply made with a drawing of a truss found on the internet (source: [www.polyte.com](http://www.polyte.com)), pasted together and copied to the Stage Window. After this, the Fixtures are added:

The moving head Fixtures were given intensity and position indicators. The Robe ColorWash 250 did not have a clear icon in the library, so it was pasted in.

The Martin Atomic strobes were added and given a distinctive (stock) icon. I find an intensity indicator not useful for a strobe light, so I left it out.

Then there are 18 4-channel RGB Fixtures in a 6x3 matrix, which are given color indicators, and 18 PAR64 Fixtures were also put in. These are just generic DMX channels from the library. In order to tell them apart easily, the standard icons have been replaced with colored squares matching the filter color. A smoke machine was also added (a generic DMX channel as well) and given a custom icon.

Note: when placing intelligent Fixtures, always make sure that you have the right DMX mode selected. This is often easily identified by the number of DMX channels that are used by a Fixture. Check your Fixture's manual to learn more about its DMX modes (also called personality).

Note: always use single Fixtures when using composite Fixtures like dimmer packs (multiple single DMX channels) and LED panels (multiple RGB dimmer packs). The multi-dimmer packs in the library are meant for use with unknown Fixtures with multiple channels. When using these for dimmer packs you won't always be able to control the channels separately.

### The grouping

After placing the Fixtures, the groups are made. On the example Stage we made some groups that would come in handy normally but other combinations are possible as well of course. Note that a Fixture can be part of several groups.

## The Cast Window

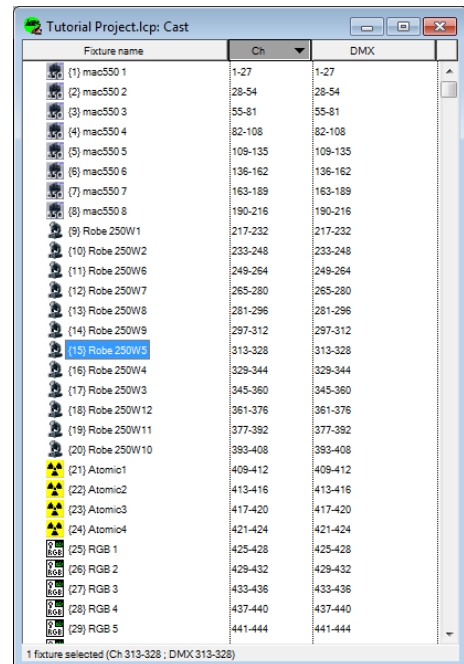
In order to see an overview of your Fixtures and their DMX channels, you can use the Cast Window. To open this, select **Window → Cast Window** (Ctrl + O / ⌘ + O). The Cast Window (Image 15) shows a complete list of all the Fixtures on your stage with their channels. As we didn't change any DMX Patch settings, the Channels and DMX Channels are the same. This list can prove itself useful when addressing your light Fixtures or when making your Patch table later.

## Viewing Patch Data

In order to get a quick overview of which Fixture Parameters are patched to which Mixer or DMX Channel, open the Fixture Setup window of the Fixture by double clicking the Fixture (if it hasn't been locked in the View Options) or by selecting the Fixture and selecting **Edit → Edit Item...** in the menu. In the Patch tab of the Fixture Setup window you can view all the parameters of the Fixture and which Channels they use (Image 17). Here you can view the Channel Offset for each parameter (first column, labeled 'O'), the control parameter name (labeled 'panel'), the Mixer Channel of that parameter, the DMX Channel (the same as the Mixer Channel if you use a 1:1 DMX Patch) and the different Patch functions (see the section Patching and Channel properties for more information).

## Renumbering the Fixtures

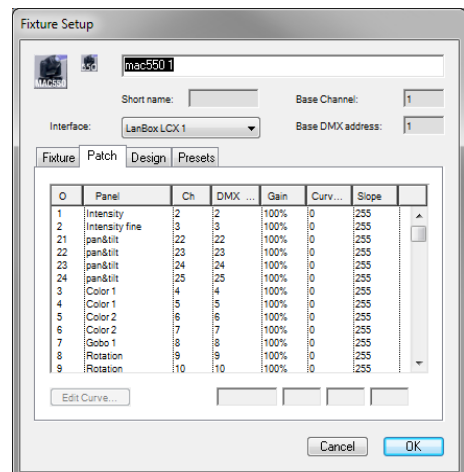
LCedit+ automatically gives a quick select number to the Fixtures you place on the Stage. To change these numbers (for example, to let every Fixture type start at another hundred, so 101 and further for moving heads, 201 and further for PAR lights), select the Fixtures you want to renumber in the order you want them numbered. In the menu, select **File → Extra → Renumber Selection** to open the Renumber Window (Image 17), give a new first number for the selection and select OK. If the range of numbers is already in use for other Fixtures, these will be renumbered with the original numbers of your selection.



Fixture name	Ch	DMX
(1) mac550 1	1-27	1-27
(2) mac550 2	28-54	28-54
(3) mac550 3	55-81	55-81
(4) mac550 4	82-108	82-108
(5) mac550 5	109-135	109-135
(6) mac550 6	136-162	136-162
(7) mac550 7	163-189	163-189
(8) mac550 8	190-216	190-216
(9) Robe 250W1	217-232	217-232
(10) Robe 250W2	233-248	233-248
(11) Robe 250W6	249-264	249-264
(12) Robe 250W7	265-280	265-280
(13) Robe 250W8	281-296	281-296
(14) Robe 250W9	297-312	297-312
(15) Robe 250W5	313-328	313-328
(16) Robe 250W4	329-344	329-344
(17) Robe 250W3	345-360	345-360
(18) Robe 250W12	361-376	361-376
(19) Robe 250W11	377-392	377-392
(20) Robe 250W10	393-408	393-408
(21) Atomic1	409-412	409-412
(22) Atomic2	413-416	413-416
(23) Atomic3	417-420	417-420
(24) Atomic4	421-424	421-424
(25) RGB 1	425-428	425-428
(26) RGB 2	429-432	429-432
(27) RGB 3	433-436	433-436
(28) RGB 4	437-440	437-440
(29) RGB 5	441-444	441-444

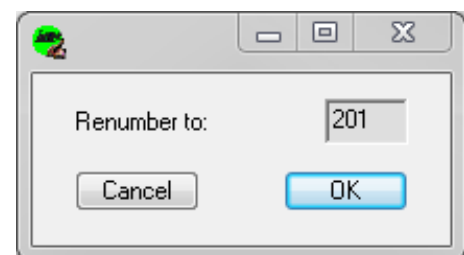
1 fixture selected (Ch 313-328 ; DMX 313-328)

Image 15: The Cast Window



O	Panel	Ch	DMX ...	Gain	Cur...	Slope
1	Intensity	2	2	100%	0	255
2	Intensity fine	3	3	100%	0	255
21	pan&tilt	22	22	100%	0	255
22	pan&tilt	23	23	100%	0	255
23	pan&tilt	24	24	100%	0	255
24	pan&tilt	25	25	100%	0	255
3	Color 1	4	4	100%	0	255
4	Color 1	5	5	100%	0	255
5	Color 2	6	6	100%	0	255
6	Color 2	7	7	100%	0	255
7	Gobo 1	8	8	100%	0	255
8	Rotation	9	9	100%	0	255
9	Rotation	10	10	100%	0	255

Image 16: The Fixture Patch information



Renumber to: 201

Cancel OK

Image 17: The Renumber window

## 5 Controlling you Fixtures

To have control over a Fixture or Channel, it will have to be placed on the stage first (see previous section). When you select one or multiple Fixtures on the Stage or in the Cast Window, one or more groups or even a combination, the Control options for these Fixtures will become available in the Fixture Controls section of the Control Panel (Image 18). In this panel you will see the following elements:

**Master Intensity:** the Gain Function for the selected Fixtures. This is not a normal control and should only be used in special circumstances. It is fully described in the Gain section on page 44.

**Fixture Controls:** here you have all the controls for the different parameters of the selected Fixture(s). If you have multiple identical Fixtures selected, these controls will apply to all of them (the controls are 'merged'). When you have Fixtures of different types selected, merging of the controls isn't possible.

**Individual intensities:** when you have multiple Fixtures selected, each Fixture will have its own individual intensity wheel here.

For now, we skip the 'Master Intensity' and proceed to the Fixture Parameter Controls right away. values of different parameters can be adjusted by either pulling the corresponding wheel, pressing a button, selecting the number box and using the up and down arrows on your key board or by typing a value in the number box directly. The TAB key can be used to jump between number boxes, Shift+TAB jumps up. When typing in the number box, typing a 'h' switches the value to a hexadecimal value, a '%' to a percentage and ending with a '.' makes it a numeric value (0-255). Typing a '+' or a '-' sign makes it a relative value ( a +10% will make 60% out of 50%).

If a parameter has buttons, pressing the button will set the parameter's Channel value to the value assigned to the button. In some cases it is possible to change a parameter within a button preset range, for example with strobe speed or continuous color scrolling. If a parameters has a 16bit value, it will have two wheels and number boxes, a course and a fine value (Image 19). The color of the value text indicates if a Channel is active in the selected Layer. If the text of the parameter value is gray, this means that this Channel is not currently activated in the selected Layer. If it is activated, the text will be black.

Next to every parameter control there are two small buttons. The lower red one indicates if the control is in Solo Mode, this will be covered in section Solo Mode on page 19. The top one indicates if a parameter value is being sent to the Mixer. This will be covered in the next section.

### Channels and Layers

It does matter greatly in which Layer you control your Fixtures. Every Layer will only process the Channels that are activated in that Layer, and will only output the values of those Channels of which the output is switched on. Normally, a Channel's output is automatically switched on as soon as it is activated in that Layer (it is possible to switch this option off, see section Other Layer Options on page 20) and can therefore influence the Channel's value in the Mixer. It is important to keep track of which Channels are active in which Layer in order to keep full control over your show. As mentioned before, if a Channel is activated in a Layer, its value will be displayed in black. You can deactivate all Channels in a Layer by selecting **Layer → Clear Layer** (Ctrl Sfit + C / ⌘ ⬆ + C) or clicking the Clear Layer button in the Layer Control Panel (see section Layer Control on page 16).

For each Fixture, you can activate any number of parameters. This means that you can control every parameter in a different Layer. In most cases, this is even highly recommended. This way you can use one Layer for a Fixture group's intensities, one for its movements, etc. The only parameters that will always be linked are the 16bit Channel pairs. Activating one of these will automatically activate the other Channel.

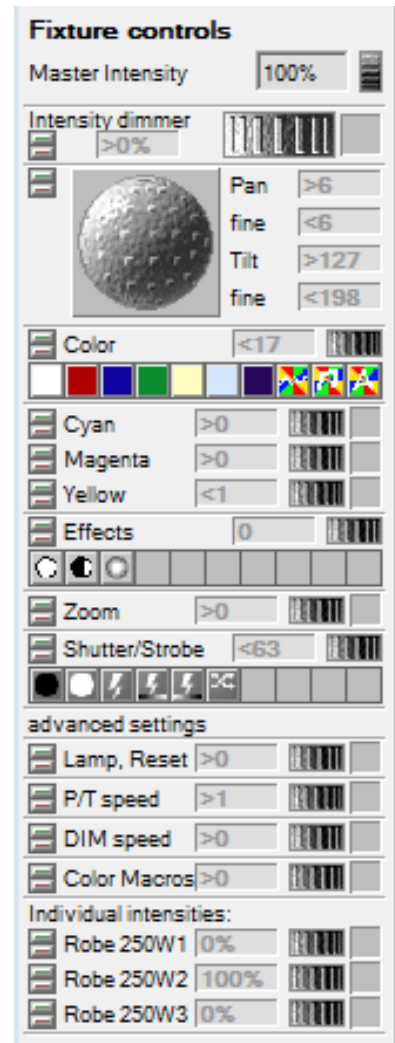


Image 18: The Fixture control panel



Image 19: a 16bit control

## Switching Output and Solo

To the left of each Parameter, there are two small buttons, the top one green, the bottom one red. These buttons control separate Channel Settings. With the top green button the output for this Channel can be toggled on or off. This automatically switches on (and the green button lights up) when a Channel is activated in a Layer, but can be switched off (and on again) using this button.

The other (red) button is used to set the Channel into Solo. This is further explained in the section Solo Mode on page 19.

## Using and making Presets

A quick way to set parameters for your Fixtures is using the Preset menus (Image 20). There are four Preset groups: Shutter (ps), used for intensity and shutter Presets, Beam (pb), used for beam parameters such as gobo and focus, Color (pc) for any presets that do not fit the other categories or are combinations of categories. Presets can be a great asset aiding you with the uniformity of your show as well as making the controlling of Fixtures much faster, especially as there can be several parameters saved in one Preset. Some of the Presets are saved in a Fixture library file, so they will already be there (see section 9 Fixture Definitions for more information on this), but it is also possible to add presets in your project.

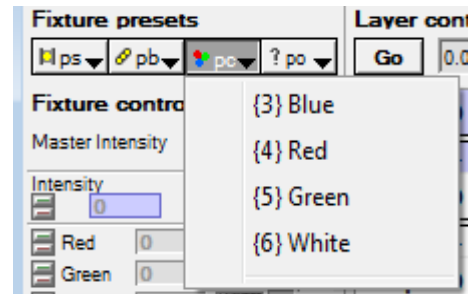


Image 20: The Preset Menu

To make a Preset, set the parameters you would like to save into the Preset in a cleared(!) Layer. While holding down the Alt / ⌘, select the desired Preset menu and the option Make Preset... will be visible (Image 21). If you select this, you will get a dialog where you can enter a name for your Preset and set the 'Define on' options. If you have selected multiple Fixtures, you can't select an option, the Preset will be saved with you project for the selected Fixtures only. If you have selected just one Fixture, you can choose to either save the Preset for that Fixture only or to save the Preset to the Fixture library file. This option means that the Fixture library is altered on your computer, and that the Preset will be available for all Fixtures of this type in this project, but in other projects as well. Only use this option if you are sure! Your Presets are automatically given a quick select sequence number when made.

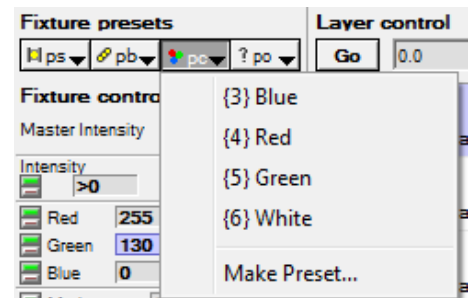


Image 21: Make Preset option

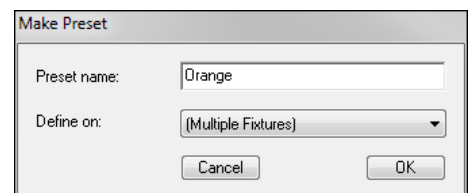


Image 22: Make Preset Dialog

## Locking the Control panel

In some cases, it is useful for the Fixture controls to remain visible while selecting other Fixtures on the stage (for example, while dragging them around to order them). For this, you can use the Lock View function. To lock the Control Panel view, click the padlock button on the bottom right of the Control Panel (Image 23). Now, whatever Fixture you select, the locked view will stay in place. To unlock, use the same button.

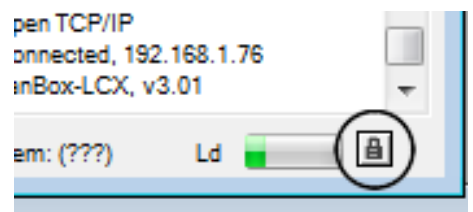


Image 23: The Lock View button

## 6 Layer Control

As mentioned before, a key element of the LanBox is the principle of Layers. With Layers, you have a very precise control of each Channel by carefully picking the Layers in which you activate Channels and run Cues. This section will show you how to get most out of your Layers.

### Basic control

Image 24 shows the basic controls of the LanBox Layers. The Go button (A) will start the Cue List entered in the Cue List Box (B). The Record button (C) will set the Layer to Edit mode. The Deactivate Channels button (D) will make all Channels in a Layer inactive and the Playback controls (E) will enable you to Play, Pause and step through Cue Lists. By clicking advanced... you open up the Advanced Layer options, which will be covered later.

### Layer Order

The order in which the Layers in a LanBox are ordered in the end influences the Channel values and can therefore be highly important. To change a Layer's position in the Layer hierarchy simply drag it to the desired position. In LCedit+, the Layers are represented in such a way that the highest Layer has the highest priority. If two or more Layers have the same Channels active, the upper most Layer determines the actual Channel value.

### Advanced Layer Options

When you open the Advanced Layer Options (the advanced... button in the Basic Controls), a panel with extra Layer options appears. In this panel, we have the following controls:

- A Layer Option Buttons
- B Manual Fade menu and control wheel
- C Chase Mode menu and control wheel
- D Layer Mix Mode menu and control wheel
- E Add Layer button
- F Layer ID
- G Delete Layer button
- H Layer Midi Show Control ID
- I On-The-Fly Edit controls

All these controls will be covered in further sections of this manual.

### Creating a new Layer

On standard boot, the LanBox-LCX has 5 Layers already initialized. In some cases this will be more than enough, but in most cases it will be necessary to add more Layers. The LanBox-LCX can have a maximum of 31 Layers. Adding a Layer is done by clicking the '+' button (E) in the advanced Layer Options panel. A new Layer will be made and automatically placed on top. Note that the Layer does not have an ID and all the Layers attributes are set to their default values. To set or change the ID, type it in the Layer ID text box (F). A Layer ID can be A through Z, AA through AZ or BA through BK.

**Note:** a new Layer is not locked by default. The reason for this is to enable Cue Actions creating and also deleting a Layer. If you want to save your Layer though when you save your LanBox data, it is necessary to lock the Layer. Unlocked Layers will not be saved!

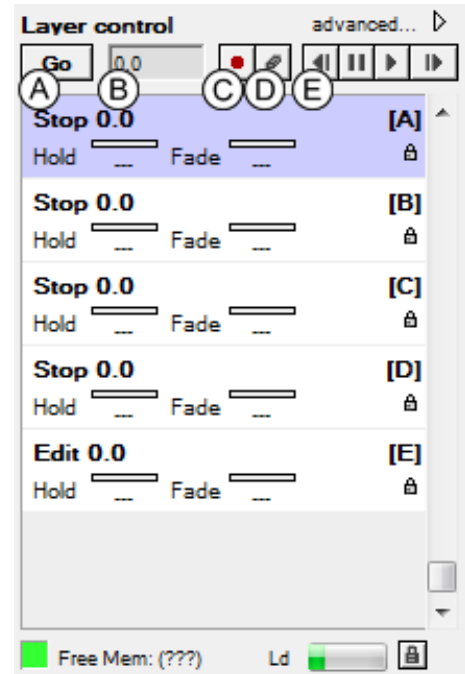


Image 24: The basic Layer controls

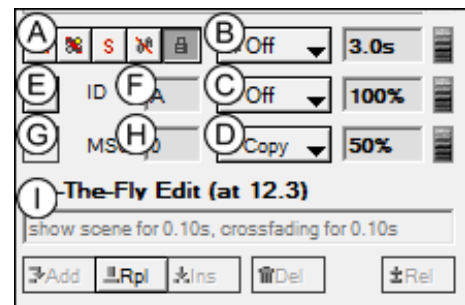


Image 25: The advanced Layer Options

## Mix Modes

The Layer Mix Modes determine how overlapping Channels will be added up between Layers. The LanBox has several ways of mixing the Layers, each of which with its own unique outcome. Only the Transparent Mix Mode uses the Transparency value. When used well, these Mix Modes can be very powerful tools, giving an extreme wide range of playback options for your show. Mix Mode and Transparency Depth are adjusted with the Mix Mode Controls, D in Image 25.

### Mix Mode: Off

None of the Channel values will be taken into account when determining the Mixer values, regardless if Channels are active in the Layer.

### Mix Mode: Copy

This is the knock-out mode. The Channel value of the top Layer will determine the Mixer value. All Channel values in underlying Layers are overridden.

### Mix Mode: HTP

HTP stands for Highest Takes Precedence. Only Channel values that have a value in this Layer that are higher than (or equal to) values in underlying Layers are taken into account.

Example:

Channel:	Layer A (top): HTP	Layer B (bottom): copy	Mixer value
1	255	127	255
2	128	128	128
3	128	255	255
4	0	0	0

### Mix Mode: LTP

LTP stands for Lowest Takes Precedence. Only Channel values that have a value in this Layer that are lower than (or equal to) underlying values in underlying Layers are taken into account.

Example:

Channel:	Layer A (top): LTP	Layer B (bottom): copy	Mixer value
1	255	128	128
2	128	128	128
3	128	255	128
4	0	0	0

**Mix Mode: Transparent**

If a Layer is Transparent (Tsp), a percentage of the Channel values is added to (or subtracted from) the values in underlying Layers. This percentage is determined by the Mix Mode Control Wheel which sets the Transparency Depth. Mathematically, the Transparent function can be represented in the following way:

$$Value = B + T * (A - B)$$

where B is the base Channel value, A is the value in this Layer and T is the Transparency Depth. Note that the ( A - B ) can also be a negative number, which would mean a subtraction!

Examples:

Ch.:	Layer A (top): Tsp 50%	Layer B (bottom): copy	Calculation	Mixer value
1	255	128	$128 + 50\% \times (255 - 128)$	191 (128 + 63.5)
2	128	128	$128 + 50\% \times (128 - 128)$	128 (128 + 0)
3	128	255	$255 + 50\% \times (128 - 255)$	191 (255 - 63.5)
4	100	200	$200 + 50\% \times (100 - 200)$	150 (200 - 50)

Ch.:	Layer A (top): Tsp 30%	Layer B (bottom): copy	Calculation	Mixer value
1	255	128	$128 + 30\% \times (255 - 128)$	166 (128 + 38.1)
2	128	128	$128 + 30\% \times (128 - 128)$	128 (128 + 0)
3	128	255	$255 + 30\% \times (128 - 255)$	217 (255 - 38.1)
4	100	200	$200 + 30\% \times (100 - 200)$	170 (200 - 30)

**Mix Mode: Add**

If a Layer is in Add Mode, it will perform a relative operation on the Channel values. It will add up the value - 128 to the values in underlying Layers. This way you can have a 'home' value of a Channel set and use relative values to adjust it. This is particularly useful when working with moving Fixtures, you can make all movement of these Fixtures relative to a home position. The Add function uses the following formula:

$$Value = B + (A - 128)$$

Where B is the base Channel value and A is Channel value in this Layer. Note that the B - 128 can also be a negative number, which would mean subtraction!

Examples:

Ch.:	Layer A (top): Add	Layer B (bottom): copy	Calculation	Mixer value
1	255	128	$128 + (255 - 128)$	255 (128 + 127)
2	128	128	$128 + (128 - 128)$	128 (128 + 0)
3	140	200	$200 + (140 - 128)$	212 (200 + 12)
4	100	200	$200 + (100 - 128)$	172 (200 - 28)

**Chase Modes**

Depending on the loaded Cue List, you can use different types of Chase Modes. What the difference is between a Chase and a normal Cue List will be explained in the section Chases on page 28. If your Cue List is a Chase, all functions described below will be applicable. If it is a Cue List with its own timing programmed into it, it will mostly behave the same way, but some functions might give unexpected results! The Chase Speed, controlled by the Chase Speed Control Wheel, determines the speed of the Chase. It can be changed from 50% (half the speed) to Infinite. Infinite in practice means 0.05 seconds per step, this is the maximum frame rate of the LanBox. Chase Mode and Speed are selected with the Chase Mode Controls, C in Image 25.

Each LanBox Layer has the following Chase Modes:

**Chase Mode: Off**

No Chase. This does not mean the sequencer of the Layer is off, but it will follow the timing in the Cue List.

### **Chase Mode: Up (Loop)**

The sequencer will step through the Cue Steps in normal order. If Loop is selected, it will return to the first step of the Cue List after the last Step. If not, it will run the Chase only once and stop at the end of the Cue List.

### **Chase Mode: Down (Loop)**

The sequencer will step through the Cue Steps in reverse order. If Loop is selected, it will return to the last step of the Cue List after the first Step. If not, it will run the Chase only once and stop at the beginning of the Cue List.

### **Chase Mode: Random (Loop)**

The sequencer will step through the Cue Steps in random order. If Loop is selected, it will start over if every Cue Step has been shown once. If not, it will run the Chase only once and stop when every Cue Step has been shown.

### **Chase Mode: Bounce (Loop)**

The sequencer will first step through the Cue Steps in normal order, and reverse when the end is reached. If Loop is selected, it will keep bouncing back and forth through the Chase. If not, it will step up and down the Chase only once and stop at the start.

## **Manual Fade**

The Manual Fade Mode and Time are used when, instead of a Cue List, Channel values are changed manually, either by changing the Parameter values or by recalling Fixture Presets. Fade Mode and time are adjusted with the Manual Fade Control, B in Image 25. The following Fade Modes are available:

### **Fade Mode: Off**

No Fade, new values will be output instantaneously.

### **Fade Mode: Fade In**

Only incrementing Channel values (values that are higher than the previous value) will be faded. Decrementing values will be output instantaneously.

### **Fade Mode: Fade Out**

Only decrementing Channel values (values that are lower than the previous value) will be faded. Incrementing values will be output instantaneously.

### **Fade Mode: X Fade**

The Cross Fade Mode. All new Channel values, either incrementing or decrementing, will be faded.

### **At Constant Rate (CR)**

This influences the way 16bit Channels will be faded. Constant Rate will make transitions smoother, but will make the overall Fade a bit less accurate.

## **Solo Mode**

A special Function of each LanBox Layer is the Solo Mode. When switched on, only the values of the Channels which are set to Solo will be output. The Solo Mode is switched on with the 'S' button in the Layer Option Buttons (A in Image 25). A Channel is set to Solo using the red button next to the Channel (the bottom one of the two small buttons left of the parameters in the Fixture Control Panel). By default, this button is turned off. If it is switched on (and it lights up red), this means a Channel is set to Solo.

## Other Layer Options

In the Advanced Layer Options, there are a few more Layer Options and Functions to adjust or control.

### Layer Option: Disconnect from mixer.

The left most button of the Layer Option Buttons (A in Image 25). When toggled On, this will disconnect the Layer values from the Mixer. In other words, all Channel values in the Layer will be ignored when calculating the Mixer values. All other functions of the Layer (Sequencing, Channel settings, Cue Lists etc.) won't be effected by this and will be restored when the Layer is connected again.

### Layer Option: Disable Fading

The Disable Fading Button is the second button of the Layer Option Buttons (A in Image 25). When toggled on, it will ignore all fading information in the Layer, either Manual Fades or Fades in Cue Lists. This means that all new Channel values will be output instantaneously. All Fade Settings are restored when this setting is toggled Off.

### Layer Option: Automatic Output Off

This is the fourth button of the Layer Option Buttons (A in Image 25). When toggled On, a parameter which value is changed in the Layer its output won't be automatically be activated in the Layer. This way, you can control manually which Channel value should be output and which shouldn't.

### Layer Option: Locked

A Locked Layer doesn't mean that a Layer can't be changed, but it prevents a Layer from being deleted either manually or by a Cue List. It also determines if a Layer will be stored when the LanBox Data is saved.

Note: by default, a new Layer is never Locked. To make sure the Layer is saved though, you will have to Lock it!

### Delete Layer

The Delete Layer Button (G in Image 25) will remove a Layer. Be careful with this, you won't be asked for a confirmation when deleting an unlocked Layer!

### MSC ID

The MIDI Show Control ID (H in Image 25) sets the ID number of the current Layer. If you want to use MIDI Show Control, each Layer you want to control should have a unique ID. This ID can be any number in a range of 1 – 127. More information on MIDI Show Control is found in the section MIDI Show Control (MSC) on page 49.

### On-The-Fly Edit

On-The-Fly Edit (I in Image 25) can be used to edit Cue Steps without opening the Cue List in the Cue List Editor. This function will be covered in the section On-The-Fly Edit on page 28.

## 7 Cue Lists

Cue Lists are the most important way to control the LanBox and your Fixtures. Virtually every function of the LanBox can be controlled through Cue Lists. There are several ways to create and edit Cue Lists which will be covered in this section, as well as all the possible Cue List Actions.

### Terminology

In order to understand this section, it is necessary to cover the terminology used in LCedit+ considering Cue Lists. For that reason, we will start with a glossary of all the terms used.

#### Cue List

The overall term for a collection of Cue Steps. Each Cue List is stored in the LanBox and identified with a number between 1 and 999. Every Cue List can contain up to 99 Cue Steps.

#### Cue Step

The smallest entity of a Cue List. This contains the Data to tell the Layer what to do. A Cue Step can contain Channel values, but this does not always have to be the case, it can also just contain 'Scripting Data'. If a Cue Step contains Channel values, it is called a **Scene** and the Channel values in the Cue Step is called the **Scene Data**. The action information in a Cue Step is called the **Cue Step Action**. Each Cue List should have at least one Cue Step.

#### Cue

A Cue consists of a number of Cue Steps separated by an 'Hold for ever' Cue Step Action. If there is no such Cue Step Action in a Cue List, the Cue consists of the entire Cue List and will end with step .0 of the next Cue List, which is a 'natural' Hold for ever Cue Step.

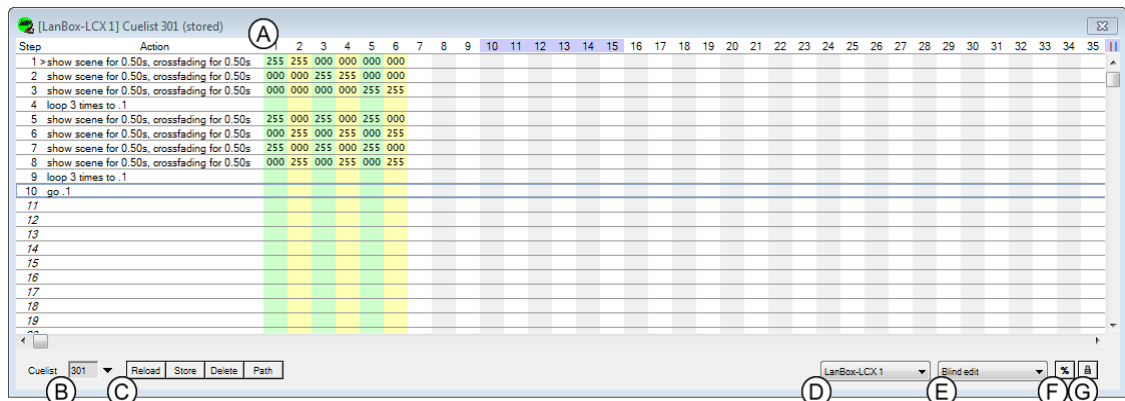
#### Chase

A Chase is a special kind of Cue List in such a way that it does only contain Scenes. It has no other Cue Step Actions like Hold , Go to or Loop.

### Creating Cues

There are two distinct ways to create and edit a Cue List, either through a Layer or by using Blind Edit. Both ways have their own advantages and disadvantages and it is up to the user to figure out which way is best in every case. (There is actually a third kind of Cue List editing, On-The-Fly Edit, but this is a more special case and covered later in this section).

## The Cue List Editor



**Image 26: The Cue List Editor**

When creating and editing Cue Lists, the Cue List Editor window will be your most complete and most important source of information and interface. A Cue List Editor window automatically opens when you open LCedit+, but you can also open a new Cue List Editor with **Window → New Cuelist Editor** in the Menu (Ctrl Shift Alt + S / ⌘ ⇧ ⌘ + S).

In the Cue List Editor, you have a column containing the Cue Step Numbers, one with the Cue Actions and a overview of all the LanBox Channels and their values. The numbers (A) indicate the Channel numbers. Channels currently selected in the Stage or Cast Window will be highlighted in blue. The Channels which have been assigned values somewhere in the Cue List will have a green/yellow background in their value fields. With the || symbol on the far right of the channel list, you can toggle the view of the Channels from 'All Channels' to 'Focus', which will only display the Channels which have been assigned values.

A Cue List is loaded by typing the number in the Cue List number box (B) and hitting Enter/Return or click Load in the Cue List Edit buttons (C). The first of these buttons actually changes function depending on the number entered in the Cue List number box. If the Cue List number entered is different from the loaded Cue List, it will say 'Load' and load the new Cue List (you will be prompted if the current Cue List is not stored yet). When the number is the same, it will say 'Reload' and will retrieve the stored Cue List from the LanBox and undo all changes made to it in the Editor. Finally, if you clear the number box, the button will say 'Clear' and present you with an empty Cue List. Loading Cue List 0 will do the same.

Alternatively, you can also click the black arrow next to the Cue List number box. This will display a menu with all the currently stores Cue Lists in the LanBox. Selecting a Cue List will automatically load it into the Cue List Editor.

The second button, 'Store', will save the Cue List to the number entered in the number box. If there is already a Cue List stored with the same number, you will be prompted to overwrite. The 'Delete' button removes the currently loaded Cue List from the LanBox. The 'Path' button opens the Path and Pattern dialog which will be covered in the section Path and Pattern Generator on page 27.

With drop down menu D you can select the LanBox you want to edit Cue Lists on. This will only apply when you are connected to multiple LanBoxes simultaneously. Drop Down menu E allows you to select the way the Cue List Editor behaves. In Blind Edit mode, all Channel values are typed into the Editor. You can also choose to Edit via a Layer (this Layer will have to be in Edit Mode, see next section) or to Follow a specific Layer. When you Follow a Layer, the Cue List that is running in that Layer will be automatically loaded and the current Cue Step highlighted. Editing of the Cue List is not possible in this Mode, which will be indicated by the padlock symbol on the far bottom right (G).

By default, the Cue List editor displays numeric Channel values (0-255), but this can be switched to percentages with the '%' button (F).

## Editing using a Layer

The easiest way to create and edit Cue Lists, especially for beginners, is to edit via a Layer. To be able to use a Layer for editing, the Layer will have to be set in Edit Mode (Image 27). This is done by clicking the red 'Record' button in the Layer Controls. If no Cue List editor is opened, LCedit+ will automatically open one with 'Edit via Layer ..' selected as Cue List Editor Mode. To start making a Cue List, load a Cue List by typing the number in the Cue List Box (in Image 27, we typed 15) and press Enter/Return or Play to load it. If the Cue List does not yet exist, LCedit+ assumes you are creating a new Cue List.

When a new Cue List is loaded, Cue Step 1 is automatically selected. Now, if you select one or more Fixtures on the Stage or the in Cast Window and change a parameter, you will see those values appear in the Cue List Editor. The Cue Step Action will be set to the last one used for a Scene Cue Step, the default will be 'show scene for 5.1s, crossfading for 5.1s'. To change this, you can double click the Cue Step Action to edit it. The possible Cue Step Actions will be covered in the section Cue Step Actions. If all Channel values are to your liking, you can click the 'skip forward' button in the Layer Controls to go to the next Cue Step. As soon as you change a Parameter value, a new Scene will be created, copying all Channel values from the previous Cue Step (except for the parameter(s) you just changed). Repeat this until you have the desired amount of Cue Steps and store the Cue List.

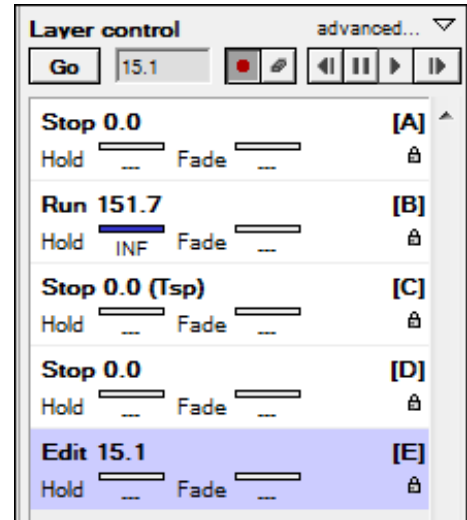


Image 27: A Layer in Edit Mode

This way, you have created a Chase Cue List. You can run this Cue List by loading in into a Layer and set it into a Chase Mode (see section Chase Modes, page 18). In order to have more control over your Cue List, you will have to add special Cue Step Actions, which will be covered further on.

## Blind Edit

If you select Blind Edit as Cue List Editor Mode, there is no Layer involved in setting the Channel values. Instead, you type the values directly into the Cue List Editor's Channel value cells. This can either be in decimal values (0-255) or percentages, depending on the setting. Deleting the contents of a Channel value cell clears the Channel. In the Channel value cells you can copy/paste as if it were a normal spreadsheet, select multiple cells using Ctrl and Shift / ⌘ and ↑ and move through the cells using the arrow keys on your keyboard. Selecting Fixtures on the Stage or in the Cast window will highlight the selected Channels in the Cue List Editor.

## Cue Step Actions

The Cue Step Actions you can set in a Cue List are the core of everything you can do in a Cue List. In this section, we will go through the most important Cue Step Actions you will need to make normal lighting Cue Lists and trigger other Cue Lists. More advanced Cue Step Actions will be mentioned here as well, but be covered in more detail in the sections that cover their specific functions.

### The Step Action Dialog

The Step Action Dialog (Image 28) is the main interface for editing your Cue Step Action. It is divided in five main tabs: Show, Go, Hold, Layer, and Special. Show will give you the basic Scene options, including fade time and type. The options under Go are used to trigger Cue Steps and Lists, as well as Loops and simple If/Then logical operators. The Hold tab sets wait options for your Cue List, the Layer tab gives options to manipulate Layer properties and the Special tab is used for Cue Step Actions that don't fit any of the other categories.

#### Show Scene of this step

The most used Step Action for normal lighting Cue Steps. It has the following parameters: the hold time, the Fade Type and, if a Fade Type is set, a Fade Time. The Fade Time can be set to 'fade at constant rate'. This influences the way 16bit Channels will be faded. Constant Rate will make transitions smoother, but will make the overall Fade a bit less accurate. If you use the Fade Types Fading in or Fading out, you have the option to Split the

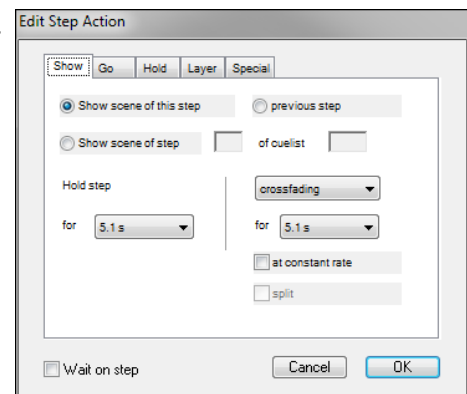


Image 28: The Step Action Dialog

Fade. With Split Fade activated, the Cue Step will ONLY Fade the values that are increasing/decreasing (depending on the Fade Type) and ignore the other values. If it is not activated, the other Channels will be set to the new value instantly.

Some examples of this Cue Step Action:

	channel: 1	2	3	4
1 show scene for 1s	0%	0%	0%	0%
2 show scene for 1s, crossfading for 1s	100%	100%	100%	100%
3 show scene for 1s, crossfading for 0.5s	0%	0%	0%	0%
4 show scene for 1s	100%	100%	100%	100%

This simple Cue List will show the first scene right away (no fade). The second Scene for a second, crossfading the whole duration of the Scene. The third Scene will be shown for a second again, only this time it will fade out for only half a second. Image 29 shows the actual DMX output.

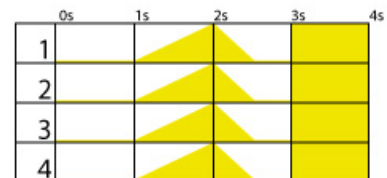


Image 29: Cue Step Example 1

	channel: 1	2	3	4
1 show scene for 1s	0%	100%	100%	0%
2 show scene for 1.0s, split fading out for 0.50s	50%	50%	50%	50%
3 show scene for 1.0s, split fading in for 0.50s	50%	50%	50%	50%
4 show scene for 1.0s, fading in for 0.50s	0%	0%	100%	100%
5 show scene for 1.0s, fading out for 0.50s	100%	100%	0%	0%

In this example Cue List, the first Scene will be shown right away again, but in the second Cue Step something special happens. Because Split Fading is selected, only the Fade Out is performed and the increasing Channel values are ignored until the next Cue Step, where a Split Fade In is selected. Note that in Cue Steps 4 and 5 Split Fade is disabled, which return significantly different outputs (Image 30).

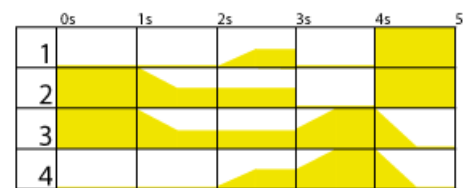


Image 30: Cue Step Example 2

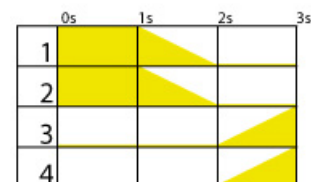
### Show Scene of previous step

This Step Action does the same as the Show Scene of this step, except that it uses the Scene data from the previous Cue Step. This can be useful when you want to use split fades (for example, first fade out one set of lights, then fade in another set). Note that Scene Data can use up a lot of memory in the LanBox, so re-using Scene Data can be a great asset when you are running short on available memory in the LanBox.

Example:

	channel: 1	2	3	4
1 show scene for 1s	100%	100%	0%	0%
2 show scene for 1.0s, split fading out for 1.0s	0%	0%	100%	100%
3 show prev for 1.0s, split fading in for 1.0s	100%	100%	0%	0%

In this Cue List, Channels 1 and 2 will first fade out in 1 second, before the other two channels will fade in (Image 31). This could also work the other way around, of course with one set first fading in with the other fading out.



### Show Scene of step .. (of cue list ..)

Image 31: Cue Step Example 3

To save memory in the LanBox, or to make a sort of custom presets which you can recall, you can refer to Cue Scene data of any saved Cue List. This way, for example, you can make one Cue List with your standard Channel values, which you refer to in other Cue Lists.

### Go to next/previous step (of layer)

These Cue Step Actions do exactly as they say they will do, go to the next or previous step. Not that useful by itself, but could become a powerful control function if you target it to a different Layer. This will perform a Step Forward or Step Back for the Cue List running in the targeted Layer.

### Go to step ..

This Cue Step Action will perform a jump in your Cue List. This could be something as simple as an infinite loop (see example), but will have countless uses in more advanced Cue List types. Notice that when a Cue Step is referred to with a Go Action, the targeted Cue Step is marked with a > sign.

Example:

	channel: 1	2	3	4
1>show scene for 1.0s, crossfading for 1.0s	100%	100%	100%	100%
2 show scene for 1.0s, crossfading for 1.0s	0%	0%	0%	0%
3 go .1				

This Cue List will perform an infinite loop, fading Channels 1 through 4 in and out (Image 32).

### Go to step .. of cue list .. (of Layer ..)

This Cue Step Action will load a Cue List at a certain Cue Step in the current Layer if no Layer is selected, or in the targeted Layer if there is a Layer ID given.

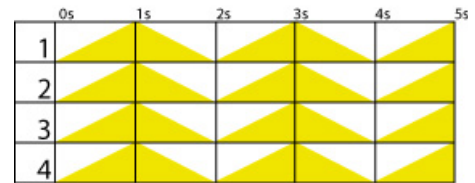


Image 32: Cue Step Example 4

### Loop .. times to step ..

This will make the Cue List skip to the given Cue Step for a certain amount of times. Note that, if you want to perform a sequence 4 times, you will only have to Loop 3 times (the sequence is already performed once before the Loop Action is encountered).

### Go to step if channel/input is within/outside

These Cue Step Actions perform a simple logic operation, checking a value of either a Mixer Channel or an Analog Input and performing a Go Action if the conditions are met. This is used extensively in using external devices for triggering events, like analog buttons/faders and external DMX sources. More on this can be found in the sections covering those functions.

### Hold step for ..

This Cue Step action pauses the execution of the Cue List for the time given. If the time is 'for ever', it will effectively stop the Sequencer in the current Layer.

### Hold until time/MTC is ..

This Cue Step Action will make the sequencer wait for a certain Time Index (either internal clock time or MTC time) before proceeding. You have the choice between waiting until the time is after (or before) the given time, or to wait for the transition. Use an x as time value to ignore this value (for example, x for the day means it will be performed every day). Note that the days are counted 0 through 6, with 0 being Monday. More information on timing is to be found in the section Using Clocks on page 35.

### Clear/Suspend/Resume/Stop/Start/Reset Layer ..

These Cue Step Actions control a Layer. Usually this is done with another Layer, but in some cases they can also point to the current Layer (for example, if you want to clear your Layer after executing the Cue List). The Actions have the following results:

**Clear:** Sequencing will be stopped, the Cue List disconnected and all Channels will be deactivated.

**Suspend:** Pause a Layer. Sequencing in the Layer will stop immediately.

**Resume:** Resume a paused Layer.

**Stop:** Stops a Layer. The current Cue Step will be executed but the next Step will not.

**Start:** Starts a Stopped Layer again, beginning with the next Cue Step after when it was stopped.

**Reset Layer:** The running Cue List disconnected, but active Channels remain active.

### **Set attributes to ..**

This will control the three of the Layer Options: Disable Fading, Disconnect from Mixer and Set Solo. For more details, see the sections Solo Mode on page 19 and Other Layer Options on page 20.

### **Set Mixer/Chaser to ..**

These Cue Step Actions can control the Mix Mode settings and the Chase Settings of the current or another Layer. For more information on these functions, see the sections Mix Modes on page 17 and Chase Modes on page 18.

When setting the Mix Mode to Transparent or the Chase mode to any other setting than Off, you can also set a value for this setting, and even set a fade time to go from one value to another.

### **Special: Comment**

You can use Cue Steps to leave a comment. These Cue Steps will do nothing else. In the Cue List Editor, comments are distinguishable by starting with a double dash --. a Comment can have a maximum of 8 characters.

### **Special: Raw Command**

For advanced users only. Every Cue Step Action is representable in 7 16bit bytes, which can be typed here. For more information on the Cue Step Action binary data, please refer to the LanBox Reference documentation.

### **Special: Write hex**

This Cue Step Action allows you to send raw hexadecimal values to either the MIDI Port or one of the Serial Outputs. More information on this you can find in the sections MIDI Out on page 50 and Using the Digital Output as a Serial Port on page 56.

### **Special: Trigger**

The Trigger Cue Step Action allows you to map a Channel value to 64 Cue Lists. Every Trigger should have an unique ID (0-63), and can trigger 64 subsequent Cue Lists. The first of these Cue Lists should be given when programming the Cue Step Action. Furthermore, the Channel to be Mapped should be given as well as the Layer to start the Cue Lists in.

For example:

*1 Tr 10 GoCue 501-564 OnCh 1024 in layer D*

Means: 'Trigger 10: Go Cue List 501-564 On Channel 1024 in Layer D' and will map the value of Channel 1024 to Cue Lists 501-564. This is done by dividing the Channel value by 4, with the exception of course that a value of 255 will start Cue List 564 (in this case).

### **Wait on step**

The check box Wait on Step tells the Cue Step to wait for a Next Step command before proceeding with the next Cue Step. This command can be given either by a Cue Step Action in another Cue List, or by clicking the Play Button in the Layer Controls. The Wait on step attribute is marked in the Cue List Edit by an exclamation mark (!) in front of the Cue Step Action.

## Path and Pattern Generator

In order to make it easier to make certain paths for moving Fixtures or patterns for vast arrays of lights, LCedit+ comes with a Path and Pattern generator. These make it possible to quickly generate the Channel values needed for complex movements or patterns. To access the Path and Pattern Generator, click the Path button in the Cue List Editor (4<sup>th</sup> button at C in Image 26). In order to use the Path and Pattern Generator, the Cue List Editor should be set in decimal mode, it will not open if the Cue List Editor is set in percentage mode.

### Path Generator

When opening the Path Generator, by default a circle is displayed, but more accurately, an ellipse with equal x and y radius (Image 33). You can select if you would like the pattern to apply for 16bit or 8bit movement (depending on your Fixtures and the mode they are set in) by checking or unchecking the box next to P/T data. The box 'Steps' sets in how many steps the movement should be divided. More Steps make the movement more accurate, but also means more data to be stored in the LanBox.

With Path type you can select the shape you want to create. Here you can choose between Ellipse, Lissajous (a sort of doubled sine wave) or Flower. The sliders set several parameters for the shape generated. Try some different settings to see what happens.

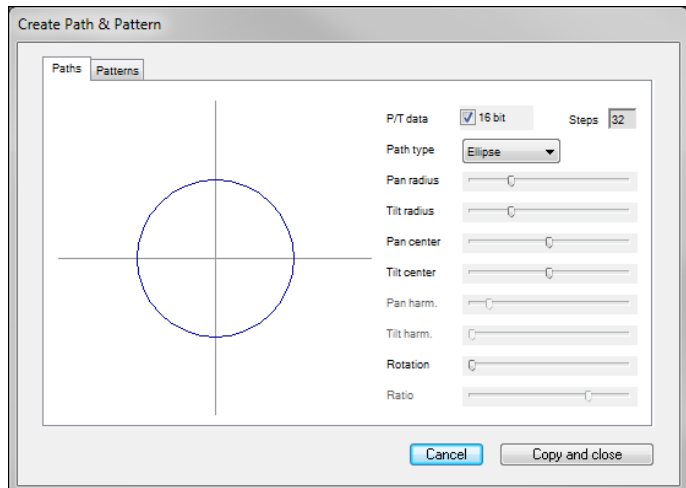


Image 33: The Path Generator

Note that all movements do not take into account the center point of a moving head Fixture, so the circle around the center would actually become a figure 8. Again, try some different movements to see what actually happens.

To use the generated Path, click 'Copy and Close'. The Channel values for the Path will be copied to your computer's clip board. Now you can paste them into the cells in Cue List Editor at the desired Channels. If you have chosen 16bit movement, 4 columns of values will have been generated, with 8bit 2 columns. The movement Channel values can be treated as normal Scene Data. Add Show Scene... Cue Step Actions to make the Cue List run (Image 34).

Step	Action	22	23	24	25	49	50	51	52
1	> show scene for 0.50s, crossfading for 0.50s	239	000	128	000	239	000	128	000
2	show scene for 0.50s, crossfading for 0.50s	218	133	110	082	218	133	110	082
3	show scene for 0.50s, crossfading for 0.50s	167	063	112	010	167	063	112	010
4	show scene for 0.50s, crossfading for 0.50s	109	255	139	208	109	255	139	208
5	show scene for 0.50s, crossfading for 0.50s	072	128	182	128	072	128	182	128
6	show scene for 0.50s, crossfading for 0.50s	067	132	216	228	067	132	216	228
7	show scene for 0.50s, crossfading for 0.50s	088	193	221	010	088	193	221	010
8	show scene for 0.50s, crossfading for 0.50s	115	248	187	101	115	248	187	101
9	show scene for 0.50s, crossfading for 0.50s	128	000	128	000	128	000	128	000
10	show scene for 0.50s, crossfading for 0.50s	115	248	068	155	115	248	068	155
11	show scene for 0.50s, crossfading for 0.50s	088	193	034	246	088	193	034	246
12	show scene for 0.50s, crossfading for 0.50s	067	132	039	028	067	132	039	028
13	show scene for 0.50s, crossfading for 0.50s	072	128	073	128	072	128	073	128
14	show scene for 0.50s, crossfading for 0.50s	109	255	116	048	109	255	116	048
15	show scene for 0.50s, crossfading for 0.50s	167	063	143	246	167	063	143	246
16	show scene for 0.50s, crossfading for 0.50s	218	133	145	174	218	133	145	174
17	go 1								
18									

Image 34: A Path copied into the Cue List Editor

### Pattern Generator

With the Pattern Generator (Image 35), you can quickly create simply patterns for large arrays of lights. It works largely the same way as the Path Generator. After making the pattern, the Channel Data is copied to the clip board and is available for pasting into the required cells of the Cue List Editor. If you use multiple rows, the Pattern Generator assumes that the Fixtures are number left to right, top to bottom (so with a 12x3 grid, the top row starts with channel 1, the second with 13 and the third with 25).

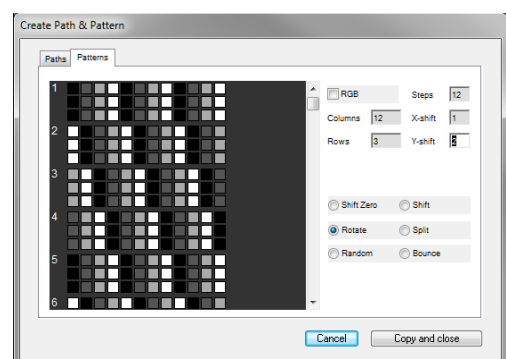


Image 35: The Pattern Generator

## Manual Cue Action Editing

You do not necessarily have to open the Cue Step Action Dialog to edit your Cue List Actions. If you click on a Cue Step Action while holding Ctrl / ⌘, you can edit the Cue Step Action by typing. You can type the exact same text as the Dialog would generate, but there are some 'shortcuts'. For example, *g 4.1 in b* will be translated by LCedit+ to *Go 4.1 in layer B*. The most commonly used abbreviations are:

Go	g
show scene for	show sc (for can always be left out)
scene	sc
in layer B	in b
crossfading	xf
channel	ch
input	in
within	wi
outside	out

It is also possible to copy/paste complete Cue Steps (including Step Action en Scene Data), either by using the copy and paste shortcuts or by Alt/ ⌘ dragging the Cue Step. Alt/ ⌘ dragging a Cue Step will automatically insert an extra Step (and adjust Go Actions to point at the moved Steps if necessary).

## Running Cue Lists

To run and test a Cue List, select the Layer you want to run the Cue List in and type the Cue List number in the Cue List Box of the Layer Control (B in Image 24, page 16). If you only type the Cue List number, the Cue List will start at the first step. If you add a Cue Step number (separated with a full stop), the Cue List will start running at that Cue List. If you type a 0 (zero) as Cue Step number though, the Cue List will only be loaded into the Layer, but not be executed.

With the Cue List controls you can manipulate the Cue List sequencing, by stepping forward and backward, or pausing/resuming and stopping/starting a Cue List. If you start Cue List 0 in a Layer, this will Reset the Layer. Note though that this only unloads the running Cue List, it does not clear the active Channels. To do this, click the Clear button (with the eraser symbol, next to the Record Button), select **Layer → Clear Layer** in the menu bar or press Ctrl Shift + C / ⌘ ⇧ + C.

## Chases

Like mentioned before, a Chase is nothing more then a Cue List without Go Cue Step Actions. In order to Play back a Chase, start it in a Layer as you would do with a normal Cue List. If the Layer's Chase Mode is set to off, the Cue List will run once and be unloaded (the sequencer will actually stop at step '0' of the next Cue List). To make the Chase Loop up, down, Bounce etc., set the Layer Chase Mode to the desired setting. See section Chase Modes on page 18 for more information on Chase Modes.

## On-The-Fly Edit

On-The-Fly Edit was the original way of creating and editing Cue Lists in the first types of LanBox. This has been largely replaced by the Cue List Editor and most functions are not supported any more. The only function that is still supported is editing the Cue Step Action parameters while a Cue List is running in a Layer. To do this, click the On-The-Fly Edit box while the Cue List is running (the Layer must be in Run Mode, not in Edit Mode). The Cue Step Action dialog for the current Cue Step will appear. Any changes made in the Cue Step will be immediately stored on the LanBox.

## 8 Running Shows

Once you have programmed all your Cue List, it is time to run a Show. LCedit+ and the LanBox give you several options to optimize play back, which will be covered below.

### Layer Information feedback

Every Layer active in the LanBox has a block in the Layer Control panel giving you information on that Layer. It tells you whether it is currently running a Cue List, which List and Step it currently is running and if it is paused or not, what the Layer is currently doing and which attributes are activated in the Layer.

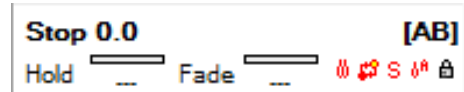


Image 36: Layer information feedback

### Layer State

The sequencer in every Layer can have the following states: Run, Stop, Paused and Wait.

**Run** means the sequencer is running a Cue List, using the timing of the Cue List. The current Cue List and Step number are shown.

**Stop** means that no Cue List is running. It can be however that a Cue List is loaded but Run is suspended. This will be shown as Cue Step number 0. Giving the Layer a Go command will set the state back to Run

If a Layer is **Paused**, it has halted the sequencing of the loaded Cue List. This can also be mid-Step and mid-Fade. If a Go command is given to the Layer, the Cue List will be (re)loaded, but the sequencer will remain Paused.

**Wait** means that the Layer is waiting for a Next (or Previous) Step command before proceeding. A Go command will cancel out this state and return the Layer to Run state.

### Hold and Fade indicators

Underneath the Run State, two bars are displayed. These give the Hold and Fade Time of the current Cue Step. As LCedit+ does not update real time, these numbers and bars are merely an indication, not always the exact time.

### Layer Attributes

At the bottom right of each Layer block, up to five icons display the Layer Attributes. From left to right these are:

**Output disabled:** when this icon is visible, the outputs of the Layer are disconnected from the mixer.

**Disable fading:** when this icon is visible, fading in the Layer is disabled (both Manual and Cue Lists)

**Solo Mode:** when this icon is visible, the Layer is in Solo Mode.

**Automatic Output:** visible if the Layer Automatic Output is switched Off.

**Layer Locked:** This indicates if the Layer is locked or not.

### Cue List information feedback

To see exactly what a Cue List is currently doing, there are two feedback options, the On-The-Fly Edit information and the Follow Layer function of the Cue List Editor.

#### On-The-Fly Edit feedback

In the On-The-Fly Edit section of the Advanced Layer Options panel, the Cue Step Action of the current Cue Step is visible. This way you have direct feedback of what is happening in the Layer.

#### Follow Layer

If you want more information on the currently running Cue List and Steps, you can set the Cue List Editor to Follow a specific Layer (see page 22 on how to do this). The Cue List Editor will automatically load the Cue List running in the Layer and highlight the current Cue Step. This will not only give you feedback on the Cue Step Action, as well as show the Scene Data of the Cue Step.

## Channel information feedback

In order to monitor the actual values of your Mixer and DMX Channels, there are several possibilities: the Stage, the Fixture Control Panel and the DMX Monitor.

### Monitoring through the Stage

In order to monitor your Fixtures, you can change the view of your Fixture Icons to display their Intensities, position (for moving lights) and color (for RGB Fixtures). See the section View options on page 10 on how to do this.

### Monitoring through the Fixture Control Panel.

When you select a Fixture (or a group of Fixtures) in your Stage, the Parameter values of the selected Fixture(s) are shown in the Fixture Control Panel. Note that, if the parameters are active in the selected Layer, the values given in that Layer will be visible (in black) but these won't necessarily be the actual values (a Layer above can also influence those parameters). If the parameters aren't active in the selected layer, the values will appear in gray and will show the current values.

### The DMX Monitor

The most complete feedback for Channel values can be obtained via the DMX Monitor (Image 37). The DMX Monitor can be opened with **Window → New DMX Monitor** or **Ctrl Shift Alt + M** / **⌘ ⇧ ⌥ M**. With the drop down menu on the left you can select what you want to monitor. You can choose to view the current Channel values of either the Mixer, the DMX Output, the DMX Input, the Analog Inputs or any of the Layers. With the '%' button you can switch between viewing numeric values or percentages. Recently changed Channel values are displayed in red. Note that, in order to see Mixer Channels, these Channels will have to be patched in your Stage.



Image 37: The DMX Monitor

## Show Automation

Although it is possible of course to start every Cue List manually, it is much easier to use some kind of automation to start Cue Lists and set Layer Properties. An easy way to achieve part of this is to use a system of master and slave Cue Lists. This means that you use one Cue Lists to control and trigger other Cue Lists in other Layers.

For example:

In Layer A, you have the following Cue List running:

	channel:	1	2	3	4
1 go 101.1 in layer AA					
2 hold for ever					
3 go 102.1 in layer AA					
4 hold for ever					
5 go 103.1 in layer AA					
6 hold for ever					
7 go 104.1 in Layer AA					
8 hold for ever					
9 go .1					

Cue Lists 101 through 104 are 'normal' Cue Lists, setting lighting scenes. Now, you can simply use Next Step in Layer A to start a Cue List in Layer AA. To keep things organized, it is recommended to keep master and control Cue Lists and Layers connected. Like in this example, use Layer A to control Layer AA, B to control layer AB etc. and use Cue List 1 to start Cue Lists 101 through 200, Cue List 2 to control Cue Lists 201 through 300 etc.

A more complicated example:

Let us assume the following situation: we have a group of moving head Fixtures, whose movement amplitude we want to control through an otherwise unused Channel (in this example, Channel 513). We use Layer B to control Layer AB, which runs the moving heads Path Cue Lists. Layer AB though is set to the Mix Mode Add (see section Mix Mode: Add on page 18) and we have a home fixed home position set in an underlying Layer X (see table). Now, if we add another Layer (here BB) above that Layer which contains the home position again but is set to transparent, we can control the movements amplitude. In order to do this, Layer BB also runs a Cue List to check Channel 513's value and control its Transparency.

Layer	Mix Mode	Information
Layer B	copy	Runs Cue List 2 which triggers Cue Lists 21-30 in AB
Layer BB	transparent	Has the Home position for the moving heads set and runs Cue List 201
Layer AB	Add	Runs Cue Lists 21-30 that control the movements. Because the Mix Mode = Add, the movements are around the position set in Layer X
...		
Layer AX	copy	Only used to control Channel 513
Layer X	copy	contains 'home values' for all used Fixtures

Cue List 2:

	channel:	1	2	3	4
1>go 21.1 in layer AB					
2 hold for ever					
3 go 22.1 in layer AB					
4 hold for ever					
5 go 23.1 in layer AB					
6 hold for ever					
7 go 24.1 in Layer AB					
8 hold for ever					
9 go 25.1 in Layer AB					
10 hold for ever.					
11 go 26.1 in Layer AB					
12 hold forever					
13 go 27.1 in Layer AB					
etc...					

Cue Lists 21-30 contain the data controlling the movements so everything works the same way as in the first example. The big difference is in Cue List 201, running in Layer BB:

	channel: 1	2	3	4
1>go .3 if channel 513 within 26 - max				
2 set layer to mix transparent at 0%				
3>go .5 if channel 513 outside 27 - 51				
4 set layer to mix transparent at 10%				
5>go .7 if channel 513 outside 52 - 76				
6 set layer to mix transparent at 20%				
7>go .9 if channel 513 outside 77 - 101				
8 set layer to mix transparent at 30%				
9>go .11 if channel 513 outside 102 - 126				
10 set layer to mix transparent at 40%				
11>go .13 if channel 513 outside 127 - 151				
12 set layer to mix transparent at 50%				
13>go .15 if channel 513 outside 152 - 176				
14 set layer to mix transparent at 60%				
15>go .17 if channel 513 outside 177 - 201				
16 set layer to mix transparent at 70%				
17>go .19 if channel 513 outside 202 - 226				
18 set layer to mix transparent at 80%				
19>go .21 if channel 513 outside 227 - 250				
20 set layer to mix transparent at 90%				
21>go .23 if channel 513 within 0 - 250				
22 set layer to mix transparent at 100%				
23>go .1				

What happens here: every frame, the Channel value 513 is checked by this Cue List. If this value is 255, all 'If' statements are returned with a True. This means that the Cue List will skip to Step 3, then Step 5, Step 7 etc. until it reaches Cue Step 21, where the Layer Transparency is set to 100% and the whole Cue List is run again (go .1). This means that the Channel information in the Layer is completely ignored by the LanBox Sequencer. If the Channel value is 90 however, the 'If' statement in Cue Step 7 is returned with a False (90 is NOT outside 70 and 101). This means that, instead of skipping ahead to Step 9, Cue Step 8 is performed, the Layer transparency is set to 30% and the Cue List resumes again (returning True for every If statement). This will result in a 70% smaller movement of the moving head Fixtures relative to the position set in this Layer BB, which was the home position.

This is just one example of the extensive possibilities of scripting in the LanBox. Note that the Channel number (here 513) can be any Mixer Channel and that this Channel can also be linked to an external Input, as we will see in later sections.

## Using i-cue

If you want to change several parameter Channels at once, you can use the i-cue function in LCedit+. When you press the i-cue button, the Fixture Controls will be set in a 'Blind' Mode. This means that any change you make to the parameters won't be applied until the i-cue is applied. Note that the parameters indicators on the left go blue when in i-cue mode. Clicking the i-cue button again or hitting space applies the i-cue, shift + space / ↑ + space cancels the i-cue.

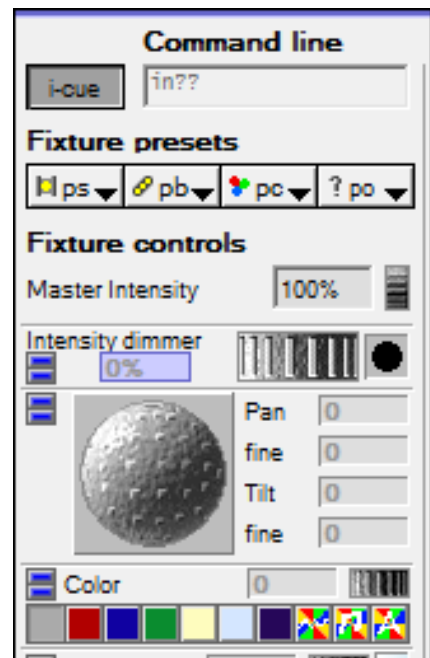


Image 38: Fixture Controls in i-cue mode

## Keys and Macros

LCedit+ has a number of ways to make interfacing with and controlling the LanBox easier and faster. It has several keyboard shortcuts to access certain functions, Command Line to quickly start Cue Lists or select Fixtures and customizable Key Strokes to create shortcuts to specific functions.

### Keyboard shortcuts:

General LCedit+ functions					
Action	Windows	OSX	Action	Windows	OSX
New Project	Ctrl + N	⌘ + N	Undo	Ctrl + Z	⌘ + Z
Open Project	Ctrl + O	⌘ + O	Copy selected	Ctrl + C	⌘ + C
Close Window	Ctrl + W	⌘ + W	Cut selected	Ctrl + X	⌘ + X
Save Project	Ctrl + S	⌘ + S	Paste	Ctrl + V	⌘ + V
Print Window contents	Ctrl + P	⌘ + P	Select All	Ctrl + A	⌘ + A
Quit LCedit+	Ctrl + Q	⌘ + Q	Auto update LCedit+	Ctrl Alt + R	⌘ ⌥ + R
Save LanBox Data	Ctrl Shift + S	⌘ ⇧ + S	Update LCedit+ now	Ctrl + R	⌘ + R
Window Management					
Action	Windows	OSX	Action	Windows	OSX
Open new Stage Window	Ctrl Alt Shift + T	⌘ ⌥ ⇧ + T	Open new DMX Monitor	Ctrl Alt Shift + M	⌘ ⌥ ⇧ + M
Open new Control Panel	Ctrl Alt Shift + C	⌘ ⌥ ⇧ + C	Open Cast Window	Ctrl + 0	⌘ + 0
Open new Cue List Editor	Ctrl Alt Shift + S	⌘ ⌥ ⇧ + S	Cycle through windows	Ctrl + TAB	⌥ + TAB
Stage Window functions					
Action	Windows	OSX	Action	Windows	OSX
Select All Fixtures	Ctrl Alt + A	⌘ ⌥ + A	Duplicate Item(s)	Ctrl + D	⌘ + D
Select Similar	Ctrl + T	⌘ + T	Make Group	Ctrl Alt + M	⌘ ⌥ + M
New Fixture	Ctrl + K	⌘ + K			
Layer functions (Only available if a Control Panel is selected)					
Action	Windows	OSX	Action	Windows	OSX
New Layer	Ctrl Shift + N	⌘ ⇧ + N	Go Previous Cue	Alt + -	⌥ + -
Delete Layer	Ctrl Shift + L	⌘ ⇧ + L	Go Next Cue List	Alt + PgUp	⌥ + PgUp
Ctrl Shift + N	Ctrl Shift + C	⌘ ⇧ + C	Go Previous Cue List	Alt + PgDn	⌥ + PgDn
Switch to Edit Mode	Ctrl Shift + E	⌘ ⇧ + E			
Go Next Cue Step	Ctrl + =	⌘ + =	Grab DMX values	Ctrl + G	⌘ + G
Go Previous Cue Step	Ctrl + -	⌘ + -	Copy Control Panel values	Ctrl + '	⌘ + '
Go Next Cue	Alt + =	⌥ + =	Paste Control Panel values	Ctrl + ;	⌘ + ;
General Actions					
Action	Windows	OSX	Action	Windows	OSX
Select Next Fixture	Ctrl Alt + ↓	⌘ ⌥ + ↓	Move current Layer Down	Ctrl Shift + ↓	⌘ ⇧ + ↓
Select Previous Fixture	Ctrl Alt + ↑	⌘ ⌥ + ↑	Toggle i-cue Mode	i	i
Add Next Fixture to selection	Ctrl Alt Shift + ↓	⌘ ⌥ ⇧ + ↓	Select Go field Control Panel	u	u
Add Prev. Fixture to selection	Ctrl Alt + ↑	⌘ ⌥ + ↑	Select Intensity parameter Field	v	v
Select Next Layer	Ctrl + ↓	⌘ + ↓	Select Pan parameter Field	x	x
Select Previous Layer	Ctrl + ↑	⌘ + ↑	Select Tilt parameter Field	y	y
Move current Layer Up	Ctrl Shift + ↑	⌘ ⇧ + ↑	Show parameter Channel number.	Ctrl + mouseover	⌘ + mouseover
Go Field shortcuts					
Action	Windows	OSX	Action	Windows	OSX
Increment Cue Step	↑	↑	Decrement 5 Cue Steps	Shift + ↓	⇧ + ↓
Decrement Cue Step	↓	↓	Go entered Cue List + Step	Enter	Return
Increment 5 Cue Steps	Shift + ↑	⇧ + ↑	Go in new Layer	Alt + Enter	⌥ + Return
Fixture Control shortcuts (Only available in Fixture Control Panel)					
Action	Windows	OSX	Action	Windows	OSX
Increment value	↑	↑	Apply Data	Enter	Return
Decrement value	↓	↓	Cancel Data entry	Esc	Esc
Increment value by 10	Shift + ↑	⇧ + ↑	Activate all parameters	Alt + Enter	⌥ + Return
Decrement value by 10	Shift + ↓	⇧ + ↓	Deactivate all parameters	Alt + Backspace	⌥ + Backspace

## Command Line Interface (CLI)

A lot of functions of LCedit+ that would otherwise require multiple mouse clicks, are quickly accessible through the Command Line Interface (CLI). The CLI is activated automatically if one of the Command Keys is pressed (Image 39) and the command is applied with Enter/Return. To execute more than 1 Command, separate the commands with a ; (semicolon). The following Commands can be used:



Image 39: The Command Line Interface

Key	Function	Example	
<b>g</b>	Go	g10.1	Start Cue List 10.1 in current Layer
		g301a	Start Cue List 301 in Layer A
		g1af2	Start Cue List 1 in Layer AF of Interface 2
<b>k</b>	Select Fixture	k70	Select Fixture {70}
		k1-10	Select Fixtures {1} through {10}
		K17,19,21	Select Fixtures {17}, {19} and {21}
<b>l</b>	Select Group	l3	Select Group <3>
		l1-2	Select Groups <1> and <2>
		l8k101-116	Select Group <8> and Fixtures {101} through {116}
<b>m</b>	Run Macro	m5,6	Run Macros 5 and 6
<b>n</b>	Select Layer	nx	Select Layer X
<b>p</b>	Select Preset	pc3	Select Color Preset {3}
		po1	Select Other Preset {1}
		ps7pb5,8	Select Shutter Preset {7} and Beam Presets {5} and {8}
<b>r</b>	Repeat last Command		Last Command is re-entered to be edited or executed again
<b>s</b>	Set Channel	s127=255	Set Channel 127 to 255 in current Layer
		s1-16f=0	Set Channels 1 through 16 to 0 in Layer F
		S27-36,41-48ab=20	Set Channels 27-36 and 41-48 to 20 in Layer AB

## Keystroke Editor

With the Keystroke Editor you can create your own keyboard shortcuts in LCedit+. These shortcuts will be saved with your project. To add shortcuts, first open the Keystroke Editor (Tools → Keystroke Editor..., Image 40). Press the keyboard combination you would like to create a Keystroke shortcut for and add the Command Line Interface Command to link to it. Be aware that the Keystroke Editor does not check if Keystrokes are already used for other functions. Check above tables to see if they are!

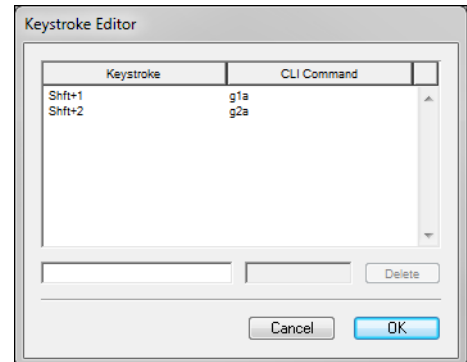


Image 40: The Keystroke Editor

## Command Macros

Command Macros are a recorded sequence of LanBox commands. This means that you can save a series of commands and recall them whenever you want. To start recording a Command Macro, select Tools → Record Macro in the menu. Now you can do all the things you would like to record. Note that not the mouse clicks and/or Keystrokes are recorded, but only the actual Commands that are sent to the LanBox. This means that, for example, anything you do in the Stage Window (which isn't stored on the LanBox) will not be recorded! When you have performed all the actions you would like to save, select Tools → Stop Record to end the recording. When you do, you will be asked for a name for the Command Macro.

To run a Command Macro, select it in the Macro list by turning the Command Macro selection wheel in the Control Panel (Image 41) and click the Run button. Alternatively, you can also use the CLI command **m** followed by the Command Macro number.

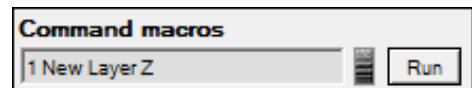


Image 41: The Command Macro interface

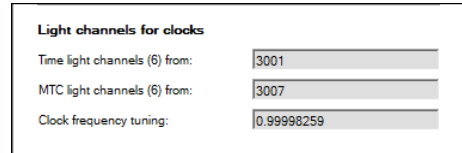
To remove Command Macros, select Tools → Delete Macros... in the Menu and select the Macro(s) you want to remove.

## Using Clocks

The LanBox has an internal Clock that allows you to synchronize Cue Lists with the time. As the LanBox does not have an internal power supply, the actual time is not remembered when the LanBox is powered off, and will be reset every time you boot. There are a few ways however to set the time.

### Using the internal Clock

By default, when you boot the LanBox, the internal Clock will be reset to Monday, 00:00:00.00. It is possible though to adjust the Clock. In the Global Settings (Tools → Global Settings...), under the DMX tab, you can find the Clock Settings (Image 42). Here you can assign 6 Mixer Channels to the internal Clock. By doing this, you achieve three things: you have created an interface to monitor the Clock, you can adjust the Clock using these Channels and on boot, the LanBox now resets the time to the value these Channels have when the LanBox Data is saved. To make it easier to monitor the Clock, LCedit+ has a Clock Fixture in its Fixture Library (under Generic).



Light channels for clocks

Time light channels (6) from: 3001

MTC light channels (6) from: 3007

Clock frequency tuning: 0.99998259

Image 42: The LanBox Clock Settings

The Clock frequency tuning is used to fine-tune the internal Clock. Because the processor does not have an exact number of 'ticks' per second, it is possible that the Clock might be about 1 second 'slow' every day. Although this isn't much, it might accumulate over time. To Clock frequency tuning corrects this. For the LanBox-LCX, the best tuning is 0.9998259 (0.9963220 for the LCM, 0.9970608 for the LCE).

The 6 Channels that can be assigned to the Clock have the following content:

Channel 1: Day Number (0 – 6 where 0 is Monday)

Channel 2: Hours (0 – 23)

Channel 3: Minutes (0 - 59)

Channel 4: Seconds (0 – 59)

Channel 5: Frames (0-29)

Channel 6: Frames/seconds, fixed at 30

With the Channels assigned to the Clock, it is possible to manipulate the Clock through Cue Lists. For example, we can set the following Cue List to run right after boot:

	channel:	3001	3002	3003	3004	3005	3006
1 -- setclock							
2 show scene for 0.05s		0	9	0	0	0	
3 clear layer							
4 hold until time x:09:00:10:00							
5 go 201.1 in layer A							
6 hold until time x:09:01:00:00							
7go 202.1 in layer A							

This will set the internal Clock to Monday, 9:00:00.00 and wait for 10s before executing the Cue List in Layer A (the x means the day data is ignored, so it will run every day. This can be used for the hours, minutes and even seconds as well). After this, the Cue List will wait for 9:01:00.00 before starting the next Cue List in Layer A.

## Using NTP

If the LanBox is connected to a network and/or the internet, it is possible to have the Clock synchronized with a Network Time Protocol (NTP) Server. The address of this server can be set in the communication (comm) tab of the Global Settings (Tools → Global Settings..., Image 43). Nearly every system has an NTP server built in, as well as a lot of internet routers/modems. In OSX and most Linux systems the NTP server is switched on by default, on Windows systems it needs to be switched on. To do this, open the regedit program and locate:

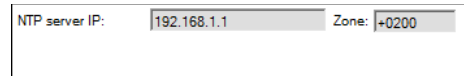


Image 43: NTP settings

HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\TimeProviders\NtpServer\

In the right pane, right-click Enabled, click Modify and set the value data to 1. Close regedit and either restart the system or restart the Windows Time Service by typing the following command in the Windows command prompt: net stop w32time && net start w32time.

If you have no NTP server on your network but you are connected to the internet, you can also use an NTP server on the internet. Usually, your ISP has one on ntp.<isp name>.<domain>.

Note that the LanBox updates its time every 10 minutes. This can be seen as flooding/abuse by some public NTP services!

To set the LanBox to use an NTP server, fill in its IP address in the NTP settings. Url's are not supported, it has to be an IP address. NTP is always sent as UTC (Coordinated Universal Time), so you will have to correct the time for your timezone and summer/daylight saving time. This is done in the Zone box. The correction is typed as ±hhmm, where ± is the + or the – of your time zone, hh are the hours and mm the minutes. So for Western Continental Europe the correction is +0200 in summer time, +0100 in winter and for USA West Coast it is -0400 in summer and -0500 in winter.

In the Cue Step Action Dialog, you can select the option 'locked time' in the Hold tab. This means that only NTP confirmed time is observed.

## Using MIDI Timecode

An alternate way of synchronizing the LanBox time is by using MIDI Timecode (MTC). The LanBox will only accept the so called quarter-frame messages, SysEx full-frame messages are ignored. As with the normal time, the MTC time can be linked to Mixer Channels as well. This is also done in the Global Settings (Tools → Global Settings...) under the DMX tab (Image 42). The only main difference with the normal time is that MTC has a choice of frame rates. The possible frame rates are: 24fps (standard for film), 25fps (PAL video), 30fps (non-drop NTSC) and 30fps Drop Frame (drop frame NTSC).

In the Step Action Dialog you have the option only to use 'locked' MTC. This means that the LanBox will ignore inconsistent or erratic MTC messages.

## Timed Cue List Example

	channel:
1>--	
2 Hold until locked time before x:18:00:00:00	
3 Hold until locked time before 5:00:00:00:00	
4 Hold until locked time after x:09:00:00:00	
5 go 90.1 in layer B	
6 Hold for 15m	
7 go .1	

This Cue List will do the following:

First, it will wait until the time is *before* 18:00, which means that it will wait if the time is between 18:00 and 0:00. After midnight it will proceed to the next Step and check if it is a week day (day 5 = Saturday). If it is Saturday or Sunday, it will wait until it is Monday (day 0), which is *before* day 5 again. Finally, it will check if it is *after* 9:00 in the morning and if it is, run Cue List 90.1 once in Layer B. It will then wait for 15 minutes before it starts over again. So what it actually does in the end is start Cue List 90 every 15 minutes, Monday till Friday between 9:00 and 18:00.

## Using external triggers

There are quite some possibilities to control the LanBox using external controls. These are all so extensive that they are covered in their own sections. The possible external inputs are:

**MIDI Notes**, section Note-On and Note-Off, page 47

**MIDI CC messages**, section MIDI Control Change Messages, page 48

**MIDI Show Control**, section MIDI Show Control (MSC), page 49

**DMX Input**, section Use DMX Input values, page 51

**Analogue Inputs**, section Using Analog Inputs as trigger, page 55

**UDP Channel values**, section Receiving Channel data, page 58

## IR remote control

This section only refers to the LanBox-LCE and LCM. The LanBox-LCX does not have an Infrared sensor.

In order to use a remote control, you will first have to perform a setup for the remote control. The following protocols are supported:

Sony, 12, 15 and 20 bits

Philips, RC5 and RC6

NEC, most protocols

The IR keys can be custom mapped to a LanBox command. The LanBox can save two IR Key Maps. By default, Key Map 1 is the Apple Remote, Key Map 2 is the Sony RM-V202.

### Mapping the IR Keys

Press any key on the remote except the power or menu key. The LanBox will display NEC, RC5, RC6 or Sony if it recognizes your remote control. Press the Power (or Menu) button 3x short, 1x long, 3 times short to enter the Setup (Short is shorter than ¼ second, long 1 second). The display should say IR1 when the sequence is recognized. Press the Power button again (within 5s) to toggle between the Key Mapping of IR1 and IR2.

Now, the LanBox Display will go through all the Key Commands. For each command, press the appropriate button on the remote control. If you want to skip a command, press the Power button. After the last command, the LanBox will return to its normal mode and a Cue List (number 999) is created which contains all the commands. This will not be saved though until you save the LanBox Data. This can be done with LCedit+ or with the remote control button assigned to 'record'.

### Using the IR controls

If the LCE/LCM is in the Home menu, the display will show '----' (if the LCM boots in MIDI mode, it will show '====' in the display). You can switch to any menu item from the Home menu by pressing the corresponding number (see the table below). The display will briefly show the name of the item followed by its value. When there are multiple items, you can cycle through them by pressing the number again. The Power button toggles between the Home menu and item 5, Layer/Cue Lists.

To edit a value in a menu Item, press the Play button. The value will blink to indicate that it is in edit mode. Use the number buttons or the up/down buttons to enter a new value and apply with the Play button (or cancel with the Power button). Note that, when using the number buttons, you will always need to include the leading zeros (so 005 for 5%).

All edited values are not stored permanently until you store the LanBox Data.

**IR Menu Items**

Button	Item	description	Shortcuts	
1	Load	Load a Cue List and Step.	Fast forward	Next Cue
			Rewind	Previous Cue
2	Store	Save the current Scene		
3	Fade Time	Set the Fade Time to be stored with 'Store'		
	Fade Type	Set the Fade Type to be stored with 'Store' 0 = No Fade, 1 = Fade In, 2 = Fade Out, 3= Cross, 4 – 7 = Constant Rate of 0 – 3.		
4	Hold Time	Set the hold Time to be stored with 'Store'		
5	Play	Play back Cue Lists. Use up/down to change Layer.	Stop	Stop sequencer
			Pause	Pause Sequencer
6	Speed	Change the Chase Speed of the Layer selected in 5		
	Mode	Change the Chase Mode of the Layer selected in 5		
7	Start Ch.	Set the Start Channel of the range of Channels you want to view or set	Fast forward	Next Channel
			Rewind	Previous Channel
8	End Ch.	Set the End Channel of the range of Channels you want to view or set	Fast forward	Next Channel
			Rewind	Previous Channel
9	value	View or Set the value of the Channels set with menu items 7 and 8. Channels are enabled when set. Disable the Channels by setting a negative value. Only enabled Channels are stored with item 2.	Up/Down	Change value
			Stop	Disable selected Channels
0	Configure	Press Play, then a 4 number code followed by Play again to enter a Configuration item. The 2 items are: 0001: Toggle between Next/previous Cue or next/previous Step for the Next Cue command  9172: Erase All LanBox Data. Press the Record Button for 10 seconds.		

## 9 Fixture Definitions

This section will cover viewing, managing and editing the Fixtures in the LCedit+ Library.

### Fixture Library

LCedit+ comes with a Library that contains most common Fixtures from the leading manufacturers. The number of manufacturers and product is growing every day though and it is impossible to keep it complete and up to date. That is why you can edit and make your own Fixtures in LCedit+.

To open the Fixture Library, select **Window → Library Editor**. The Library Editor Window (Image 44) will show a List of all the Fixtures currently in the Fixture Library. Double-click an item to open the Fixture Definition Dialog.

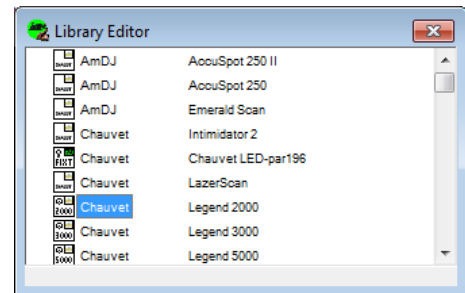


Image 44: The Library Editor Window

The Fixture Definition Window (Image 45) by default opens in the Design Tab. Here you can view the different controls and the corresponding Channels. All the Fixture Parameters are divided up in 'panels'. These are the controls you see in the Fixture Control Panel. There is no theoretical limit to the amount of Parameters and Controls you can assign to a Fixture, but screen size is a limitation. If a Fixture definition has so many controls that it won't fit on the screen, consider leaving away controls you don't use or choose more compact control interface methods (a small wheel instead of a large wheel, or a wheel instead of buttons).

### Editing a Fixture

Note that the Fixture Library is shared by all you project files. Changing a Fixture Definition will effect other projects as well!

To change a Fixture control, select the control in the list in the Fixture Definition Dialog. The lower half of the dialog will show the Control Interface type, the way the Channel information is displayed (decimal, hexadecimal or percentage), the Control Label (the name displayed above the Control) and the Channels the control applies to. The Channel number is an offset! This means that the 1<sup>st</sup> Channel of a Fixture will have Channel 0, the 2<sup>nd</sup> 1, etc.

The order of the Controls determines the order in which they appear in the Fixture Control Panel. Use the Move up and Move down buttons to change the order. The top Control must ALWAYS be a large wheel named Intensity! This is even the case if your Fixture doesn't actually have a master Intensity. In this case, leave the Channels blank. This is to ensure correct behavior of the Fixture Controls when they are grouped. The separator option determines if a separating line is displayed above the Control. The Delete button will remove the selected control from the list and therefore from the Fixture Control Panel.

The Iconstrip button opens a dialog which assigns icons to specific Channel value ranges. More on this in the next section.'

An edited Fixture Definition is automatically saved when the dialog is closed with OK. When closed with Cancel, all changes will be discarded.

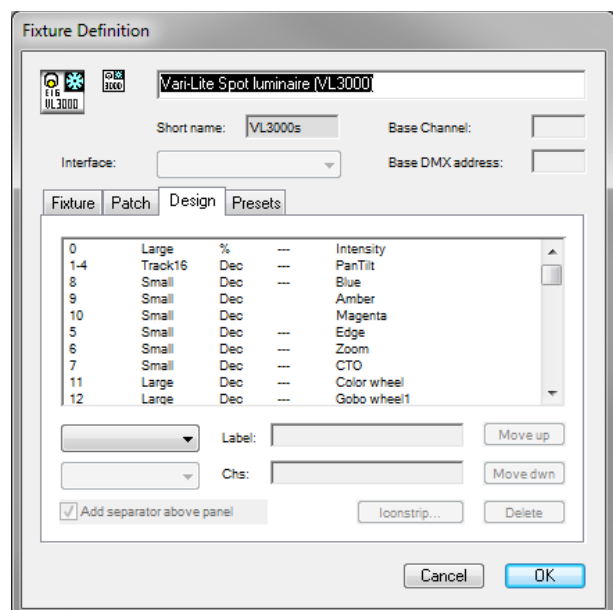


Image 45: The Fixture Definition Window

## Creating a Fixture

In order to make a new Fixture, it is always advisable to have a DMX table/chart of the Fixture. This is usually printed in the Fixture Manual. If the Fixture is similar to an already existing one, you can duplicate that Fixture and edit it, or you can make a new one from scratch.

To duplicate an existing Fixture, select **Edit → Duplicate Item** in the menu, to create a new Fixture, select **Edit → New Fixture**. The Library Editor should be the active Window to perform either of these actions. Below, only the creating of a new Fixture will be explained, as it will cover all the elements you would need to edit or duplicate a Fixture as well.

### Making a New Fixture

When creating a New Fixture, a new, empty Fixture Definition Window will appear. First, give the Fixture a name. We have chosen to make a Fixture Definition for the Robe ColorSpot AT in this example, all the information we use for the Fixture is obtained from [www.robe.cz](http://www.robe.cz). The normal name can be the full description of the product, the short name should be as short and compact as possible but still be descriptive enough to identify it on the Stage (as this is where the short name will be used). We found the DMX chart for the Fixture on the Robe website (see Appendix I: ColorSpot 250AT DMX chart), and we have chosen to use mode 1.

### Master Intensity

The first control to add is the Master Intensity. To add a control, click in the (now empty) Controls List and select Large Wheel from the top left drop down menu. Label the Control Intensity and assign the appropriate Channel Offset (in this case Channel 16). Because the Intensity of this Fixture is 16bit, we could have chosen a 16bit Wheel, but because of before mentioned Grouping behavior we don't. Instead, we will add a Small Wheel which we will label Intensity fine and assign it Channel 17. Because these two controls belong together, we leave out the separator above this control. We give both controls a Percentage property (Image 47). One consequence of splitting these Controls is that the LanBox will not recognize these two Channels as one 16bit control. If you do want to use the 16bit functionality however, there is still a solution for this which is covered in the section 16bit Table on page 46.

### Pan Tilt Control

The next Control to add is the Pan Tilt Control. For these parameters, LCedit+ has the Trackball Control. Click in an empty part of the Controls list again and add a Trackball 16bit by selecting it in the Control drop down menu. Label it Pan Tilt and assign the appropriate Channels (0-3 in this case). Because it is a group of Channels, the first and last Channel of the group are typed, separated by a dash. You can also type the different Channels separated by commas (0,1,2,3). Leave the separator checked.

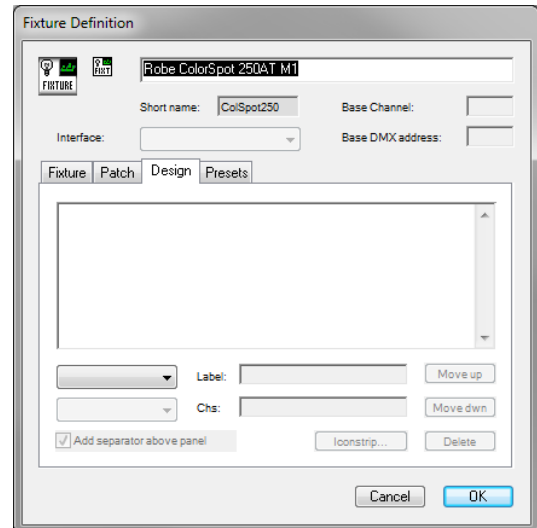


Image 46: New Fixture Definition Window

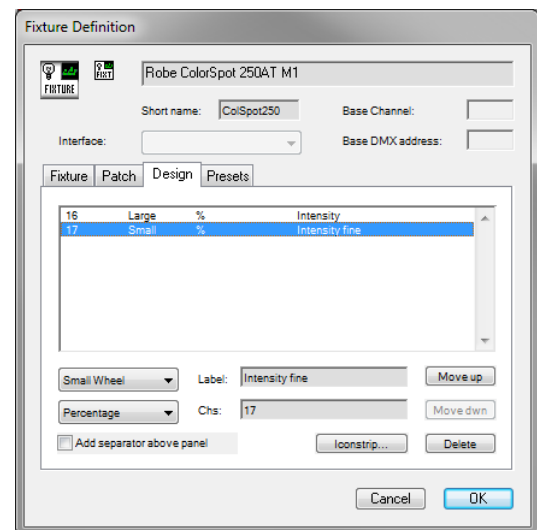


Image 47: Intensity Controls added

## Wheel with icons: Color and Gobo Wheel

The next control is a more complicated one, the Color Wheel. There are several ways to add this control. We can choose to just add a wheel, but this will not give us any indication of which color we have selected. We could also add Buttons, this gives direct access to the different colors, but lacks the possibility to scroll the colors but will allow steps. The best choice here seems to be a Wheel with Icons. We achieve this by clicking an empty part of the Controls list again and adding a 16bit Wheel (this Fixture in this Mode has 2 Channels for the Color, which makes it 16bit). First, we Label the Control again (Color) and assign the Channels (6,7), but then we hit the Iconstrip... button. This opens up the Edit Icon Strip dialog for this control.

Image 48: The Color Icons for the Robe ColorSpot 250AT

Icons in the LCedit+ Fixture Library are made up by a series of 16x16 pixel icons, placed in a line (Image 48). The Robe ColorSpot 250AT has 27 possible settings for the Color Wheel, so we need 27 icons. This makes that the Icon Strip image will be  $27 \times 16 = 432$  pixels wide (and 16 pixels high). The LCedit+ package contains an example Icon Strip. Note that the 16x16 pixels Icons are used for the 'large' icons next to the Large Wheel. For the Small Wheel and Buttons, 12x12 pixel Icons are used.

You can make the Icon Strip with any software you prefer, save it and drag the file into the Edit Icon Strip dialog. LCedit+ will automatically distribute the Channel value over the Strip but in this case we don't want that. If we look at the DMX chart, we can see that on the values 0-128, the colors aren't steps but 'proportional', which means that it is a continuous scroll. The way to apply this is as follows:

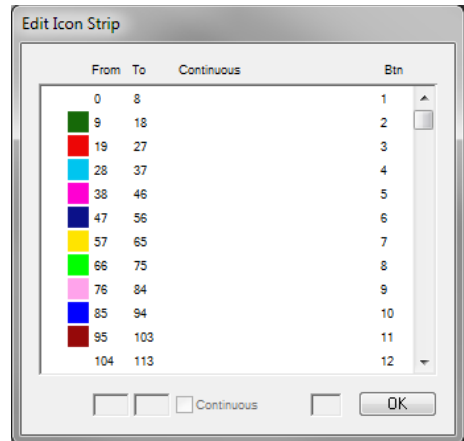


Image 49: The Edit Icon Strip dialog

Select the first (white) icon. We set it to be active between Channel 0 and 0, but check the 'Continuous' box. This makes this Icon and the next one to scroll. Note that it now says that it is continuous from value 0 to the high value of the next icon. We repeat this for the whole first series of Icons, up until the second white Icons. After this, the DMX Chart tells us that the next colors are all 'Step', which means that it will snap to a color if the DMX value is in the specified range. So, for the next cycle of colors, we leave the Continuous box unchecked. Just fill in the correct start (should be filled in automatically) and end value for each color Icon.

If we arrive at the Rainbow effects, the Chart states them as proportional again, but actually they are not Continuous in the sense as we use it. The DMX value in the range does influence the Effect speed, but the Icon should remain the same. This is why we do not use the Continuous function here. In the end, the Icon Strip should look like Image 50. Note that there are also button numbers displayed in the Icon Strip Dialog (Btn), but these are not used right now and will be covered when we're making buttons.

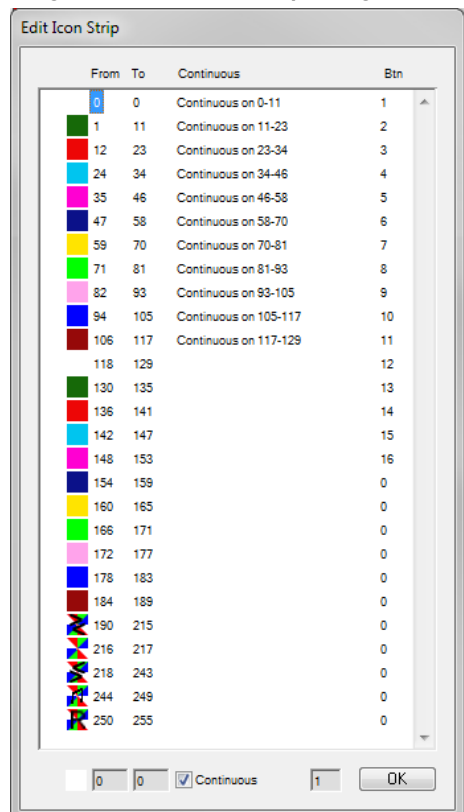


Image 50: Complete Color Icon Strip

The Gobo Wheel will be roughly the same as the Color Wheel, although the Gobo control is only 8bit, which allows us to use a normal Large Wheel on Channel 8. Again, we attach an Icon Strip, but it is a bit larger this time. The DMX Chart shows us that there are a total of 35 different possibilities for the Gobo: Static Gobo, Rotating Gobo, Shaking Gobo, Rotating and Shaking Gobo as well as some cycling functions. Again, we have made an Icon Strip (Image 51, the Gobo graphics we found on the Robe website) and assigned the correct DMX values. This time, no continuous values are needed at all. For the Gobo Indexing/Rotation we add a 16bit control labeled Gobo Index on Channels 9,10 (without separator). Note that we also could have made buttons for this Parameter, but with 35 different settings, it would take up a lot of space in the Fixture Control.



Image 51: The Robe ColorSpot 250AT Gobo Icon Strip

### Buttons with icons: The Prism and Shutter

The Prism Parameter has no proportional functions, so it is ideal for buttons. Again, we make an Icon Strip (Image 52) with 14 icons (open, prism and 12 macros). In the Fixture Definition Dialog we add a Buttons Control, assign Channel 11 and label it Prism. Now we add the Icon Strip by clicking the Iconstrip... button and adding the Icon Strip Image. Now we set all the Channel values to match the DMX chart and end up with what's shown in Image 53. After this we add a Small Wheel control for the indexing and rotation of the Prism.

If we look at the Shutter function in the DMX Chart, we see that there are 9 settings, but that the No Function (shutter open) is repeated 4 times. We only need it once though. The way to handle this is to make a normal Icon Strip 9 Icons wide as shown in Image 54. Note that there are a few black Icons in there. These were added because we are not planning to actually use them for a button. In the Edit Icon Strip Dialog, it is possible to assign another button number to each Icon. If you assign Button 0 (zero), the Icon won't be used at all. So in case of the Shutter Function, we assign a 0 to Icons 4, 7 and 9, the duplicates of the No Function setting and the black Icons in the Strip (Image 55).

### Other functions

In order to finish the Library File for this Fixture, we add the last Controls: a 16bit wheel for the Focus on Channels 13,14, an extra set of buttons for the Fixture Power/Function Parameter and a small wheel for the Pan/Tilt Speed. In the end, our Fixture Definition looks like Image 56. Clicking OK automatically saves the Definition, clicking Cancel will discard any changes made.

As a finishing touch we give the Fixture a nice Icon as described in the section Changing your Fixture icon on page 11.

When closing the Definition Editor for a Fixture for the first time, LCedit+ will ask where to save your Definition File. The file should always be saved in the Library folder in the LCedit+ folder. The name of the sub folder determines the manufacturer name in the Fixture Library. Make sure that the file name is a unique name!



Image 52: Prism Icon Strip for the Robe ColorSpot 250AT

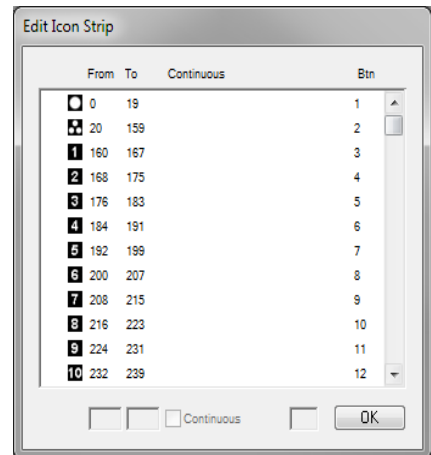


Image 53: Edited Icon Strip for the Prism control



Image 54: Shutter Icon Strip

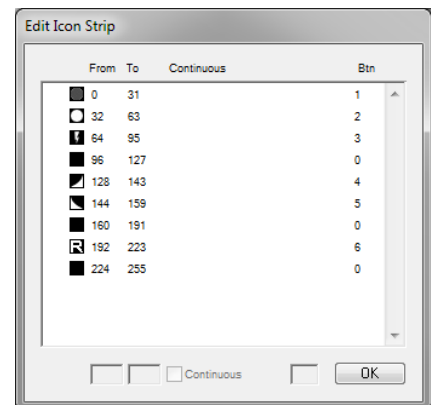


Image 55: Edited Shutter Icons, 0 = not used

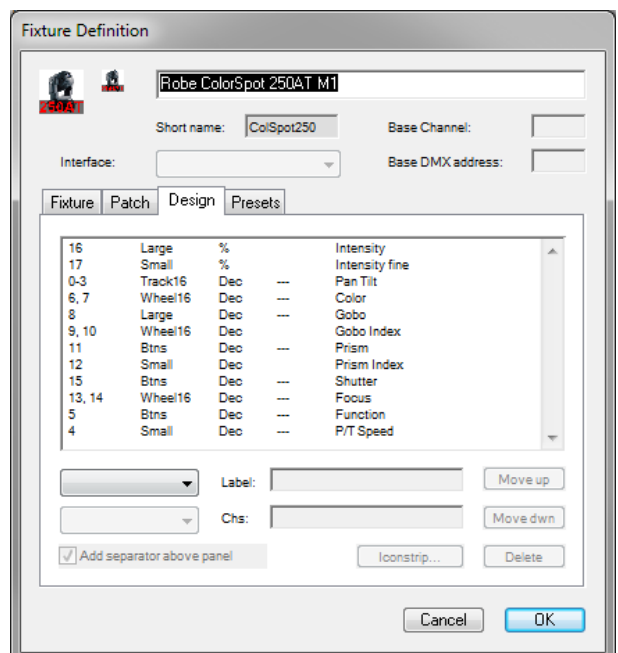


Image 56: The Finished Fixture Definition

## Creating Presets

To make control over your Fixtures easier and quicker, you can add Fixture Presets to your Fixture. These are saved with the Library file, so they will be available every time you use the Fixture. To create Fixture Presets, select the Presets tab in the Fixture Definition window (Image 57). To make a Preset, first select one of the Preset categories, then click in an empty part of the Preset field below the categories field and give a name in the text box below. When a name is given, an empty Preset will be made. Now, select this Preset and one by one, select the parameters which you want to control with this Preset (and only those parameters, leave the ones you don't want to control empty) and give them the appropriate value. For example, to make a Full Preset, select the Shutter category, click in the Presets field and give the new Preset the name 'full'. Now select the Intensity Parameter and give it a value of 255. The Presets are automatically saved with your Fixture definitions.

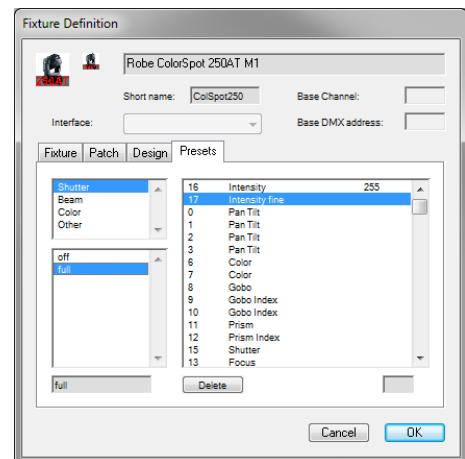


Image 57: The Presets tab

## Updating the Fixture Library

When making a new Fixture Definition, you probably want to see what it will look like now and then. Although the Fixture definition is saved automatically, you will have to reload the Fixture Library before LCedit+ will use the new Definition.

To do this, select **File → Extra → Reload Library** in the menu. This will reload all Fixture Definitions and replaces all used Definitions with the newly loaded ones.

## Importing Fixtures

To import a Fixture Definition into LCedit+, simply copy the Library file into the Library folder of LCedit+. You will have to make sure that the both the file name as well as the Fixture name are unique.

## 10 Patching and Channel properties

The LanBox-LCX had 3072 Mixer Channels which can all be patched and be assigned properties. This section will cover all these possibilities. The Channel Properties and Patch are edited with the Patch Editor (Tools → Patch Editor...).

### Patch Table

Every Mixer Channel in the LanBox can be assigned to any DMX Channel. It is even possible to assign a Mixer Channel to multiple DMX Channels. To edit the DMX Patch Table, open the Patch Editor. The default view of the Patch Editor window is the DMX Patch (Image 58). The DMX Patch table is essentially a list of 512 Channel pairs. The first number is the DMX Out Channel, the second number is the LanBox Mixer Channel. A DMX Channel is patched to a Mixer Channel by selecting the DMX Channel number in the list and typing the appropriate Mixer Channel number in the 'Set to' number box at the bottom of the list.

To patch Multiple DMX Channels to the same Mixer Channel, you can select multiple Channels at once by dragging the mouse or holding Shift/⇧ to select Channels that are grouped together or hold Ctrl/⌘ to select multiple Channels that aren't grouped (Ctrl + A / ⌘ + A selects all Channels). Now, when you enter a Mixer Channel in the 'Set to' box, all selected DMX Channels will be assigned that Mixer Channel. To let LCedit+ auto increase the Mixer Channel numbers, select the ' | ' button next to the 'Set to' box. This will automatically increase every next Channel with 1. Click the ' | ' button again to turn auto increase off.

The DMX Patch Table is not stored in the LanBox until you click the Store Button, and it won't be permanently saved until you save the LanBox data.

### Gain

Before DMX values are sent by the LanBox, they are multiplied by a Gain Factor. This Gain is completely independent from Layers, Cue Lists and any other processing of the LanBox. The LanBox calculates the Channel value using the following formula:

$$\text{Output} = \frac{\text{Gain}}{128} * \text{Mixer Value}$$

So a Gain Factor of 128 (default) will multiply the Mixer value by 1 (so leaving it the same), a Factor of 0 will make it 0 and a Factor off 255 will double the Mixer value.

The Gain Factors of the DMX Channels can be set by opening the Patch Editor and selecting Gains from the drop down menu. Changing a Gain Factor is done by selecting one or more DMX Channels and setting the Factor in the 'Set to' box.

Although rarely useful, the auto increase function (activated with the ' | ' button) can also be used when setting the Gain. The Gains Table is not stored in the LanBox until you click the Store Button, and it won't be permanently saved until you save the LanBox data.

### Master Intensity Control

The Master Intensity Control in the Fixture Control Panel (Image 60) also sets the Gain Factor of the selected Fixture. Note though that this applies to the DMX Channel linked to the Mixer Channel of the selected Fixture and therefore applies to ALL Layers! For this reason, it (obviously) isn't possible to set a master intensity of Fixtures/Channels that aren't patched to a DMX Channel.

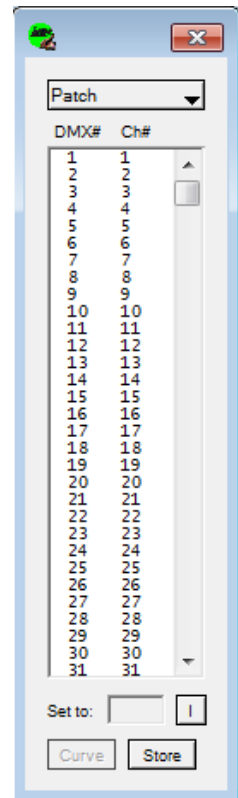


Image 58: The Patch Editor Window

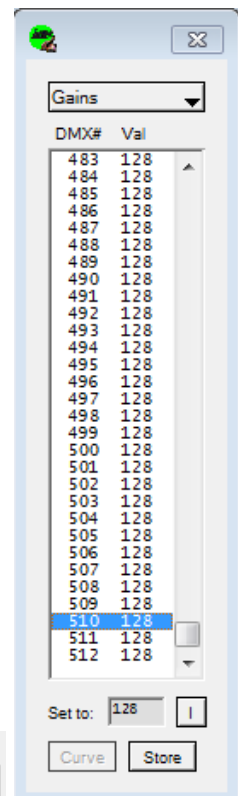


Image 59: The Channel Gains

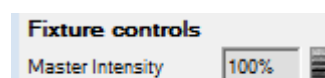


Image 60: The Master Intensity Control

## Curves

Not every Fixture responds linearly to DMX values (for example, a lot of LED lights are already at 50% of their intensity at a DMX value of only 25  $\approx$  10%). For that reason, the LanBox has the possibility to change Curve of every DMX Channel. There are 8 possible Curves, numbered 0 through 7 where, by default, 0 is the linear 1:1 Curve which cannot be changed. All the other Curves though can be customized. Every Curve is a list consisting of all 255 'input' values accompanied by an output value.

### Assigning Curves

The Curves of the DMX Channels can be set by opening the Patch Editor and selecting Curves from the drop down menu (Image 61). Changing a Channel Curve is done by selecting one or more DMX Channels and setting the Curve number in the 'Set to' box.

Although rarely useful, the auto increase function (activated with the ' | ' button) can also be used when setting the Curve. The Curves Table is not stored in the LanBox until you click the Store Button, and it won't be permanently saved until you save the LanBox data.

### Changing Curves

To change a Curve stored in the LanBox, open the Patch Editor and select the appropriate Curve from the drop down menu. Curve 0 is the default linear 1:1 Curve and cannot be changed and therefore cannot not be selected. In the Factory settings, Curve 1 is the 'inverted linear' Curve where 0 = 255 and 255 = 0, but this can be changed. All the other Curves are initially 1:1 as well. When a Curve is selected, a table of 255 values is displayed. The left value is the 'input' value, the right value the corresponding 'output' value. You can either change the Curve by editing the values like you do when changing Patch or Gain values, or choose to use the Curve Editor.

The Curve Editor is opened by selecting a Curve in the Patch Editor and clicking the Curve button at the bottom left. The Curve editor opens initially showing the already stored curve and a new 1:1 Curve. The new Curve is defined by 2 anchor points at the coordinates (0,0) and (255,255). There are 2 types of anchor points, smooth points and corner points. The smooth points are represented by a blue circle, the corner points are represented by red squares. The black pointer can manipulate all anchor points but cannot add any points, the blue pointer can add smooth anchor points as well as move them, the red pointer can add and move the corner anchor points. If you select or move a corner point with the blue pointer it will be changed into a smooth point and vice versa.

To remove anchor points the black '-' pointer can be used. When moving or adding anchor points, the coordinates of the pointer are displayed in the bottom left of the window.

If you use smooth anchor points, LCedit+ will attempt to create a flowing line through all your anchor points, but this becomes impossible when a lot of anchor points are close to each other. Note that a curve can never be made in such a way that the x values 'overlap'.

When you have created a curve, click the Create button to copy the Curve data to the Curve Table. The Curve Table is not stored in the LanBox until you click the Store Button, and it won't be permanently saved until you save the LanBox data.

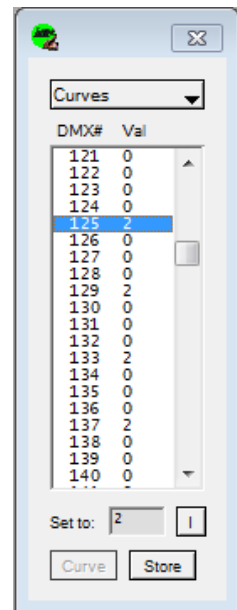


Image 61: The Curve Table

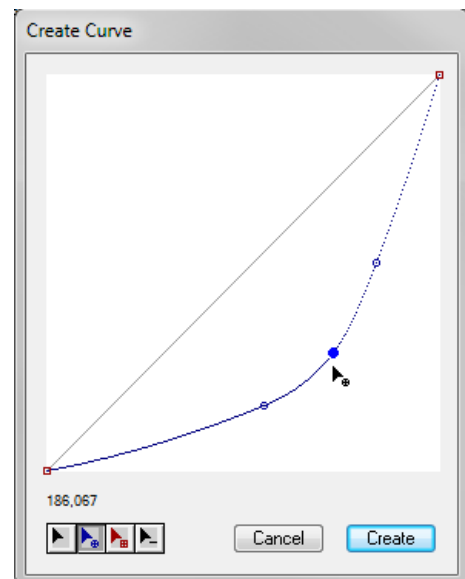


Image 62: The Curve Editor

## Slopes

Sometimes it can be required that a DMX value cannot change too quickly. Examples are high power incandescence (halogen) lights where the power levels get very high when switching to full instantaneously or big moving lights that swing too much when moving too quickly. To overcome this problem, the LanBox has the Slope function.

The Slope of a DMX Channel determines the maximum change of a DMX value for each frame. The default value is 255, which means that any change within a DMX frame is allowed, but if, for instance, the Slope value is set to 5, the maximum increase of a value is set to 5 every frame. A LanBox frame is 50ms, so with a slope of 5 it would take  $(255/5) \times 50\text{ms} = 2.55$  seconds for the DMX value to go from 0 to 255 (or the other way around).

The Slope of the DMX Channels can be set by opening the Patch Editor and selecting Slopes from the drop down menu. Changing a Channel Slope is done by selecting one or more DMX Channels and setting the Slope value in the 'Set to' box. The Slope Table is not stored in the LanBox until you click the Store Button, and it won't be permanently saved until you save the LanBox data.

## 16bit Table

In order to use 16bit DMX controls to their full extent, it is possible to link 2 (8bit) Mixer Channels to make up one 16bit value. This information is stored in the LanBox in the 16Bit table. You can view and edit this table by opening the Global Settings (Tools → Global Settings...) and select the 16-bit Tab (Image 63). Each 16bit pair consists of 2 Channel numbers which represent the Most and Least Significant Byte (MSB and LSB). The MSB is responsible for the coarse parameter adjustment, the LSB in the fine setting.

The 16bit pairs are automatically created when you place a Fixture with 16bit parameters onto the stage and automatically removed from the table if you remove the Fixture. Therefore the only reason to edit the table is when you want to override the Fixture Library settings.

To edit a 16bit pair, select a pair in the list and type the correct Channel numbers in the number boxes at the bottom of the list. The left box is for the MSB, the right for the LSB. If you want to add a pair, click on the empty line at the bottom of the list. To remove a pair, select the pair and delete both numbers in the number boxes. Every change in the list is automatically stored in the LanBox, but won't be permanently saved until you save the LanBox Data.

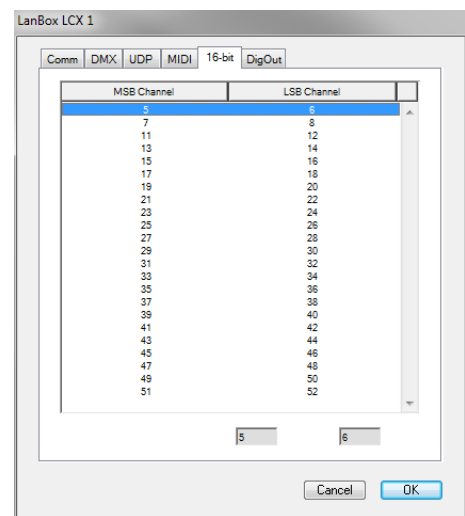


Image 63: The 16bit Table

## 11 Using MIDI

The LanBox-LCX (and in some extend the LCM) has several ways to be controlled with MIDI or to send MIDI data. This section covers these possibilities.

### Setup for MIDI

The LanBox-LCX has two MIDI ports, a MIDI In and a MIDI Out. These ports do not have a MIDI through function. To send MIDI signals to the LanBox, connect a MIDI cable from your MIDI source to the LanBox MIDI In port.

For the LanBox to process the MIDI messages, you will have to set it up to link MIDI Channels to Layers. This is done in the Global Settings (Tools → Global Settings...) in the Tab MIDI (Image 64). Here you can link any of the possible 16 MIDI Channels you would like to use to the Layer you want to send the MIDI to. This is done by selecting the MIDI Channel in the list and type the Layer ID into the 'Set to' box. The Offset is set in the right box, but this is only used when you are using Note messages (see next section). To avoid unwanted MIDI commands, it is advised to leave unused MIDI Channels blank.

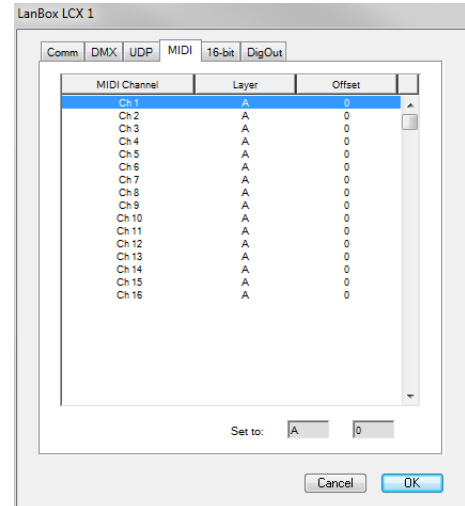


Image 64: The MIDI Table

When you use SysEx Midi Show Control messages, these will have to be send to Layers as well. To achieve this, you can set a Device ID for every Layer in the Advanced Section of the Layer Control Panel in the box marked MSC. The MSC Device ID can be 0 through 127, although Device ID 0 is generally reserved for the Master Device. For General SysEx messages, the LanBox itself also has a Device ID, this is set on on the Comm tab of the Global Settings Window. Make sure that every Layer and the LanBox itself always have a unique ID.

### Note-On and Note-Off

Every Mixer Channel in the LanBox can be directly controlled using MIDI Note messages. When using a Note-On, the Pitch determines the Channel Number, the Velocity the value. Because MIDI values are only 7bit and therefore have a maximum of 127, the Pitch value is multiplied by 2. So a Note-On with Velocity 60 and Pitch 80 will set Channel 60 to  $2 \times 80 = 160$  (because  $127 \times 2 = 254$ , an exception is made in that case and the Channel value is set to 255). In order to control Channels higher than 127, every MIDI Channel can be given an offset in the MIDI tab of the Global Settings window (see previous section). So if, for example, MIDI Channel 1 is given an offset of 127, a Note-On on that MIDI Channel with Pitch 1 and Velocity 127 will set Mixer Channel 128 to 255. a Note-Off command will switch the Channel determined by the Pitch off, regardless the of Velocity value.

### MIDI modes

Because not all MIDI controllers can be set to send Note-On messages on sliders and rotary buttons, the LanBox can be set to different MIDI modes in order to use different types of messages for the Channel Control. This Mode is set by giving Channel 3072 (the highest Mixer Channel) a specific value:

MIDI Mode setting (on Channel 3072)		
value	mode	Description
0-7	0	All MIDI commands as described in the Manual and reference guide
8-15	1	All Poly After Touch messages are handled as Note-On messages
16-23	2	All Control Change (CC) messages are handled as Note-On messages Poly After Touch messages are handled as CC messages

Note that is is possible to change the MIDI Mode on the fly by using one of the above messages to control Channel 3072.

## MIDI Control Change Messages

A Lot of control functions of the LanBox can be accessed via MIDI Control Change (CC) Messages. In order to use MIDI CC Messages, MIDI Channels have to be linked to Layers in the LanBox. This is done in the Global Settings window (see section Setup for MIDI). A complete list of supported CC messages with a complete description can be found in the LanBox Reference Document, but the most common commands are listed below.

### CC99 LayerSetTransparencyDepth

With the **LayerSetTransparencyDepth** command, you can set the Transparency of a Layer. This will only work if the relevant Layer's Mixing Mode is set to Transparent. The value determines the Layer Transparency Depth, where 0 = 0% and 127 = 100%

Controller Number	Value	Action
99	0 - 127	Layer Transparency Depth 0% - 100%

### CC90 LayerNextStep

The **LayerNextStep** command will make a Layer Sequencer jump to the next Cue Step. The value is not used.

Controller Number	Value	Action
90	Not Used	Go next Cue Step

### CC91 LayerPreviousStep

The **LayerPreviousStep** command will make a Layer Sequencer jump to the previous Cue Step. The value is not used.

Controller Number	Value	Action
91	Not Used	Go previous Cue Step

### CC76 LayerSetChaseSpeed

The **LayerSetChaseSpeed** you can set the speed at which a Layer's sequencer will run. If the Speed value is 0, the Speed Factor is set to 50%, if it is 127, the Speed Factor is set to infinite, which in practice means that Cue Steps will be performed with the LanBox frame rate (20 steps/second). The value determines the Layer Chase Speed, where 0 = 50% and 127 = infinite.

Controller Number	Value	Action
76	0 - 127	Layer Chase Speed 50% - infinite

### CC64 LayerSetSustain

The **LayerSetSustain** command influences the way a Layer behaves when receiving MIDI Notes. Putting a Layer in Sustain means that all Note-Off and Note-On messages with a velocity 0 will be ignored until Sustain is turned Off. This way, you can set multiple Channels to a value and reset them all at once. A value < 64 will switch the Sustain Mode Off, a value => 64 will switch it On.

Controller Number	Value	Action
64	0-63	Sustain Off
	64-127	Sustain On

### CC65 LayerIgnoreNoteOff

The **LayerIgnoreNoteOff** command influences the way a Layer behaves when receiving MIDI Notes. Putting a Layer to Ignore Note-Off mode means that all Note-Off messages will be ignored and only Note-On messages will be accepted. A value < 64 will switch the Ignore Note-Off Mode Off, a value => 64 will switch it On.

Controller Number	Value	Action
65	0-63	Ignore Note-Off Off
	64-127	Ignore Note-Off On

## MIDI Show Control (MSC)

It is possible to fully control the LanBox with MIDI Show Control (MSC). MSC is a subset of the MIDI SysEx standard. The purpose of MIDI Show Control is to allow MIDI systems to communicate with and to control dedicated intelligent control equipment in theatrical, live performance, multimedia, audio-visual and similar environments. The LanBox implementation of MSC is consistent with the recommended minimum set 2 (No time code, full data capability). In order to receive MSC commands each Layer should have its own MSC device ID. When using more than one LanBox in a MSC system, each Layer in each LanBox should have a unique device ID.

MIDI Show Control messages always have the following format:

**F0 7F ID 02 CF CO <data> F7**

The device **ID** points at the Layer, the Command Format **CF** is always **7F** (Lighting). The Data depends on the command **CO** and is given in ASCII values. If more then one Data set is required, **00** is used as a delimiter. The LanBox supports 16 MSC commands, which are completely covered in the LanBox Reference Document, but a the most common command is the **GO** command, listed below.

### MSC 01 GO

The **GO** command starts a Cue List at a Cue Step in the targeted Layer. The Cue List number and Cue Step number are send together, separated by a decimal point , ASCII 42, 0x2E hex. If no Cue List and Step are given, the Layer will perform a Go on the current Cue List.

General form:

**F0 7F ID 02 7F 01 <Cue List> E9 <Cue Step> F7**  
**ID** Layer Device ID  
**<Cue List>** Cue List in ASCII values  
**<Cue Step>** Cue Step in ASCII values  
 Go Cue List **<Cue List>**, Step **<Cue Step>** in Layer with Device ID **ID**

Example:

**F0 7F 04 02 7F 01 31 36 36 E9 38 37 F7**  
**04** Layer with Device ID 4 (0x04 hex)  
**31 36 36** Cue List 166 (ASCII 49 54 54, 0x31 0x36 0x36 hex)  
**38 37** Cue Step 87 (ASCII 56 55, 0x38 0x37 hex)  
 Go Cue List 166, Step 87 in Layer with Device ID 4

## MIDI Program Change Messages

A Program Change message will start a Cue List which is determined by the Program Change value in the Layer to which the MIDI Channel is assigned. Because these values can only range from 0 to 127, the MIDI Bank Select command can be used to set the Bank. This will be the MSB of the Cue List Number. So a Program Change of 110 on Bank 3 will be Cue List number:  $(128 \times 3) + 110 = 494$ .

## MIDI Out

In order to let the LanBox send MIDI, a Cue List should be created to do this. The MIDI data has to be given as 'raw data', which means the hexadecimal representation of the MIDI values. The MIDI message type and Channel are represented in the first byte of a Message, where the first 4bit nibble (the first character of a hexadecimal 8bit number) is the Message type, the second 4bit nibble the MIDI channel, where 0 is Channel 1 and F is Channel 16.

Message Name	Value	Byte 1	Byte 2
Note-Off	8c (80 = Note-Off on Channel 1)	Pitch/Key	Velocity
Note-On	9c (9E = Note-On on Channel 15)	Pitch/Key	Velocity
Poly After Touch	Ac	Pitch/Key	Pressure
Control Change	Bc	CC number	CC value
Program Change	Cc	Program number	-n/a-
After Touch	Dc	Greatest Channel pressure	-n/a-
Pitch Bend	Ec	Pb LSB	Pb MSB

To program a MIDI Out command, open a (new) Cue List in the Cue List Editor and double click on a Cue Step to open the Cue Step Action dialog. In the Special tab, we find the Write hex function (Image 65). To send a Hexadecimal command to the MIDI Out port, select MIDI in the drop down menu. The Port Number only applies to the Serial Ports and can be ignored. In the text box you can type the hexadecimal command. Although normally these are typed with upper case letters, they aren't case sensitive, LCedit+ will change lower case letters to upper case automatically.

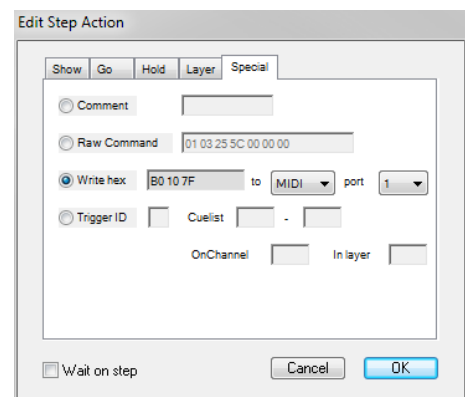


Image 65: The Write hex Cue Step Action

### Example

Let's say we have a sound desk connected to the LanBox so we can fade in or out the sound using a Mixer Channel. In this example, we use Mixer Channel 512 and have set the sound desk to map Midi Channel 1, Control Change number 16 (0x10 hex) to fader 1. This means that we will have to write the following commands: B0 (for CC on Channel 1) 10 (for CC number 16) XX, where XX is a value from 0 to 127. We'll split this up in steps of 8, which leaves us with  $(128/8 = 16 + 1)$  for 0) 17 steps. The Cue List will look like this:

Step	
1>go .3 if channel 512 within 16 - max	19>go .21 if channel 512 outside 145 - 160
2 write B0 10 00 to MIDI 1	20 write B0 10 48 to MIDI 1
3>go .5 if channel 512 outside 17 - 32	21>go .23 if channel 512 outside 161 - 176
4 write B0 10 08 to MIDI 1	22 write B0 10 50 to MIDI 1
5>go .7 if channel 512 outside 33 - 48	23>go .25 if channel 512 outside 177 - 192
6 write B0 10 10 to MIDI 1	24 write B0 10 58 to MIDI 1
7>go .9 if channel 512 outside 49 - 64	25>go .27 if channel 512 outside 193 - 208
8 write B0 10 18 to MIDI 1	26 write B0 10 60 to MIDI 1
9>go .11 if channel 512 outside 65 - 80	27>go .29 if channel 512 outside 209 - 224
10..write B0 10 20 to MIDI 1	28 write B0 10 68 to MIDI 1
11>go .13 if channel 512 outside 81 - 96	29>go .31 if channel 512 outside 225 - 240
12 write B0 10 28 to MIDI 1	30 write B0 10 70 to MIDI 1
13>go .15 if channel 512 outside 97 - 112	31>go .33 if channel 513 outside 241 - 250
14 write B0 10 30 to MIDI 1	32 write B0 10 78 to MIDI 1
15>go .17 if channel 512 outside 113 - 128	33>go .35 if channel 513 within 0 - 250
16. write B0 10 38 to MIDI 1	34 write B0 10 7F to MIDI 1
17>go .19 if channel 512 outside 129 - 144	35 go .1
18 write B0 10 40 to MIDI 1	

## 12 DMX Input

With the LanBox it is possible to either merge the DMX signal with the DMX from an external source, map some external DMX channels or use external DMX channels to trigger events.

### Set up DMX Input

The LanBox DMX Input accepts all DMX512-A signals and has a 5-pin socket. To be able to use the DMX values, the LanBox has to be told to do so. The DMX Input settings can be found in the DMX tab of the Global Settings window (Tools → Global Settings..., Image 66). Here you can set which DMX Input Channels have to be copied to which Mixer Channels and which Layer. Note that the number of Input Channels will have to be equal to the number of Light Channels and in both cases always has to be one continuous range. The Light Channels can be any range of numbers within the LanBox Mixer Channels (1-3072).

In order to actually receive the DMX Input and be able to work with it, you will have to activate the Channels in the assigned Layer! If you fail to do this, the DMX values will not be copied to the Mixer.

### Use DMX Input values

The DMX Input can be used in several ways, which will be covered below.

#### Merging DMX universes

It is possible to merge two DMX universes into one, with several different possible scenario's. We'll cover these in some examples:

**Example:** Using Highest Takes Precedence

**Situation:** The LanBox controls a set of lights, with a light console connected to the DMX In. You want the highest value of either the Cue Lists running in the LanBox or the light console to overrule the lower DMX value.

**Solution:** In the Global settings, copy DMX Input Channels 1-512 to Mixer Channels 1-512 in Layer A (assuming Layer A is your top Layer). In Layer A, make those Channels you want to apply the DMX Input to Active (for example, by changing their values). Now, set the Mix Mode of Layer A to HTP (bottom drop down menu in the Advanced section of the Layer Control Panel). This will make the LanBox ignore all DMX Input values that are lower than the result of the values in all underlying Layers and only (directly) copy the higher Channel values to the Mixer.

In the Layers underneath Layer A, you can run Cue Lists as normal.

**Example:** control a number of Channels externally

**Situation:** The LanBox controls a set of lights, but a small number of lights (for example, the lights in the entrance hallway of a venue) need to be controlled by an external lighting console. In our example, these are 16 dimmer Channels on DMX addresses 497-512.

**Solution:** In the Global settings, copy DMX Input Channels 1-16 to Mixer Channels 497-512 in Layer A (assuming Layer A is your top Layer). In Layer A, make Channels 497-512 Active (for example, by changing their values). Make sure the Mix Mode of Layer A is set to Copy (bottom drop down menu in the Advanced section of the Layer Control Panel). This will make the LanBox ignore all the values in all underlying Layers and directly copy DMX Input values of the 16 Channels to the Mixer.

In the Layers underneath Layer A, you can run Cue Lists as normal.

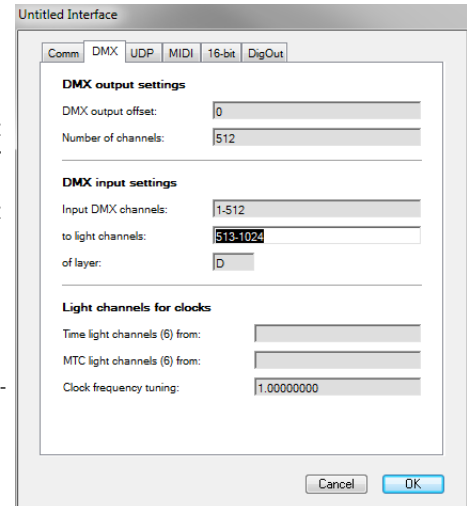


Image 66: The DMX In Settings

## Mapping external DMX values

In some situations, you might want to control some functions with the LanBox, while controlling others with an external DMX source. This is possible by copying the DMX Input to otherwise unused Mixer Channels in the LanBox and use the LanBox DMX Patch to patch these Channels to the desired DMX Output Channels.

**Example:** controlling Fixture Intensity with an external console.

**Situation:** The LanBox controls a the Lighting effects and movements of a group of moving head Fixtures. The Fixture Intensities though you would like to control with an external console. In this example, we will use 8 Martin MAC250 Krypton moving heads (in 16bit mode). These Fixtures use 17 DMX Channels each, with the Intensity on Channel 2 of those Channels. We have Patched these Fixtures on Mixer Channels 1-136 (8x17). We want to use the first 8 DMX Channels of the external console to control the intensities.

**Solution:** In the Global settings, copy DMX Input Channels 1-8 to Mixer Channels 513-520 in Layer A (assuming Layer A is your top Layer). In Layer A, make Channels 513-520 Active (for example, by changing their values). Make sure the Mix Mode of Layer A is set to Copy (bottom drop down menu in the Advanced section of the Layer Control Panel). This will make the LanBox ignore all the values in all underlying Layers and directly copy DMX Input values of the 8 Channels to the Mixer. Now open the Patch Editor (Tools → Patch Editor) and patch DMX Channel 2 to Mixer Channel 513, 19 to 514, 36 to 515 etc. up to DMX Channel 121 to Mixer Channel 520. Now, all Intensity values for these Fixtures are overruled by the first 8 Channels of the DMX Input.

## Trigger events using DMX Inputs

Making use of the scripting capabilities of the LanBox, it is also possible to use external DMX values to trigger events in the LanBox or manipulate Layer properties. This way, you can control a vast number of lights with only a few DMX Channels.

**Example:** Setting a Layer Transparency Depth with an external DMX value.

**Situation:** We control the Intensities of some Fixtures with Cue Lists running in Layer B. Furthermore, we have a small 6 Channel DMX controller with which we want to control these intensities.

**Solution:** In the Global settings, copy DMX Input Channels 1-6 to Mixer Channels 513-518 in Layer Z (or just another otherwise unused Layer). In Layer Z, make Channels 513-518 Active (for example, by changing their values). Make sure the Mix Mode of Layer Z is set to Copy (bottom drop down menu in the Advanced section of the Layer Control Panel). Now, we are going to create a Cue List setting the Transparency of Layer B (which has the Intensity Cue Lists running).

Step	
1>go .4 if channel 513 within 25 - max	13>go .15 if channel 513 outside 151 - 175
2 set layer B to mix transparent at 100%	14 set layer B to mix transparent at 40%
3>go .5 if channel 513 outside 26 - 50	15>go .17 if channel 513 outside 176 - 200
4 set layer B to mix transparent at 90%	16 set layer B to mix transparent at 30%
5>go .7 if channel 513 outside 51 - 75	17>go .19 if channel 513 outside 201 - 225
6 set layer B to mix transparent at 80%	18 set layer B to mix transparent at 20%
7>go .9 if channel 513 outside 76 - 100	19>go .21 if channel 513 outside 226 - 250
8 set layer B to mix transparent at 70%	20 set layer B to mix transparent at 10%
9>go .11 if channel 513 outside 101 - 125	21>go .23 if channel 513 within 0 - 250
10 set layer B to mix transparent at 60%	22 set layer B to mix transparent at 0%
11>go .13 if channel 513 outside 126 - 150	23>go .1
12 set layer B to mix transparent at 50%	

In this example we have only divided the range up in 11 steps, but more steps (and with it greater accuracy) is of course possible as well. You can make up to 49 steps like this when using 1 Cue List, but even more if you would use several Cue Lists. This Cue List will have to run in a Layer above Layer Z (or any other Layer you receive the DMX Input in). This has to do with the processing order of the LanBox (more information on this you can find in the Advanced section). Now, if you change the value of the first incoming DMX Channel (Mixer Channel 513 with our setup), the Transparency Depth of Layer B will change accordingly. This is just one example, but any Cue Step Action can be triggered by incoming DMX values this way.

### **Grabbing DMX Data**

You can also use the incoming DMX Data to set scene with an external DMX source and record the values into a Cue Scene. To do this, create a Cue List using a Record Layer (see the section Editing using a Layer on page 23), but this time, use the Layer you receive the DMX Input as your Recording Layer. Set the DMX values on your external source (make sure these appropriate Channels are activated in the Layer), select the Master Intensity of the Fixtures and hit Enter/Return to copy the Scene Data into the Cue List Editor. If the Master Intensity is already selected, only hitting the Enter/Return will suffice. Clicking the Step Forward button or hitting the Space will select the next Cue Step. Change the Hold and Fade of your Cue Steps to the desired settings before saving your Cue List!

## 13 In/Out Port

The LanBox-LCX has a DC37s D-sub containing 8 I/O ports which can be used to send and receive analog signals as well as sending serial commands to other devices. These ports can be completely controlled and used by Cue Step Actions. The Pin Out of the D-sub plug is shown in Image 67 and the table below. Note that all 6V outputs are identical and all 0V are all connected to the ground.

Pin		Pin	
1	0V	20	0V
2	0V	21	In 8
3	In 7	22	Out 8
4	Out 7	23	+6V
5	+6V	24	0V
6	0V	25	In 6
7	In 5	26	Out 6
8	Out 5	27	+6V
9	+6V	28	0V
10	0V	29	In 4
11	In 3	30	Out 4
12	Out 3	31	+6V
13	+6V	32	0V
14	0V	33	In 2
15	In 1	34	Out 2
16	Out 1	35	+6V
17	+6V	36	0V
18	0V	37	0V
19	0V		

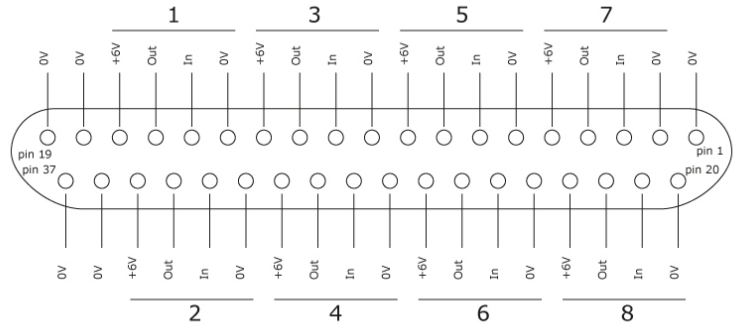


Image 67: The LanBox-LCX D-sub Pin Out

### Setting up the Analog Inputs

In order to use the Analog Inputs, some sort of sensor will have to be connected. The simplest version of this is a push button or switch, but potentiometers and more advanced sensors as light sensors are also possible. The Analog ports can detect the electric potential difference between the Input Pin and the ground. This potential can have a maximum value of 5V. The readout of the Analog Inputs 1-8 is copied to Mixer Channels 3061-3068, but can also be monitored directly in the LCedit+ DMX monitor (see the section The DMX Monitor on page 30). Note that the analog values are 10bit instead of 8bit (a range of 0-1024), so 16 values are shown for the External Inputs in the DMX monitor, 8 pairs of a Most Significant and a Least Significant Byte (MSB and LSB). The first of the 2 values (the MSB) has to be multiplied by 256 and added up to the second value (the LSB) to get the Input value. So a value of 2 56 means  $(2 \times 256) + 56 = 568$ , which is equivalent to  $(568/1024) \times 5V = 2,77V$ .

#### Connecting a switch

In order to avoid interference, the +6V voltage should be connected to the Input (look at the Pin Out to see which pins to use), using a 4700Ω resistor to stabilize the voltage and avoid a short circuit. Now you can connect a switch or button between the Input and the ground (0V). This results in a 5V potential (because of the resistor it is 5V instead of 6V) when the switch is open, but closing the switch will connect the Input to the Ground making the potential difference 0V. This will result in a Input value of ~1024 when the switch is open and a value of ~0 when closed.

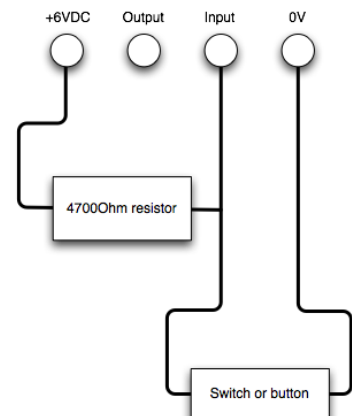


Image 68: Connecting a switch to the LanBox

## Connecting a potentiometer

To connect a fader, rotary knob or any other potentiometer, connect the potentiometer Input to the +6V, the potentiometer Output to the LanBox Input and the potentiometer Common to the LanBox 0V (Image 69). For the best results, we advise using a linear 5kΩ – 10kΩ potentiometer. As the resistance of the potentiometer varies, the potential on the Input of the LanBox changes from 6V at the minimum resistance to 0V for the maximum. In this setup, the 5V mark (= the maximum for the Input) is reached a bit before the potentiometer is at its minimum which will result in a Input value of 1024 before the potentiometer has reached its minimum. Connecting a resistor between the +6V and the potentiometer resolves this. The value of this 'voltage divider' is calculated as follows:

$$R_{divide} = R_{fader} - \frac{(R_{fader} * V_{output})}{V_{input}}$$

$R_{divide}$  is the voltage divider resistor value,  $R_{fader}$  the potentiometer maximum resistance,  $V_{output}$  the desired output voltage (= 5V) and  $V_{in}$  the input voltage (=6V). Filling in the voltages gives us the more comprehensible formula:

$$R_{divide} = \frac{1}{6} * R_{fader}$$

This means that for a 10kΩ potentiometer a  $10 * 1/6 = 1,7$  kΩ resistor is needed, but generally a 2kΩ will do the trick. If you don't need this precision, the voltage divider can be left out.

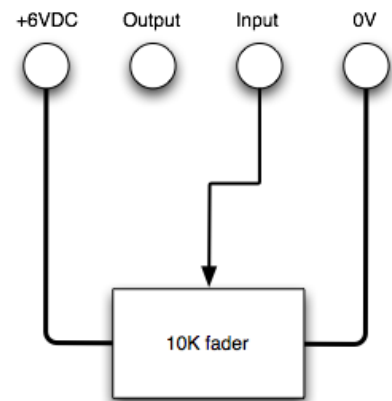


Image 69: Connecting a potentiometer to the LanBox

## Using Analog Inputs as trigger

Using the Analog Inputs to trigger events is done in roughly the same way as you would do with the DMX Input. The trigger Cue Steps can be made by selecting the Go to Step if Input function in the Go tab of the Step Action window (Image 70). The Input number can be 1 – 8, the value is either within or outside a range of 0 – 1023(max).

**Example:** Starting different Cue Lists depending on the Analog Input value.

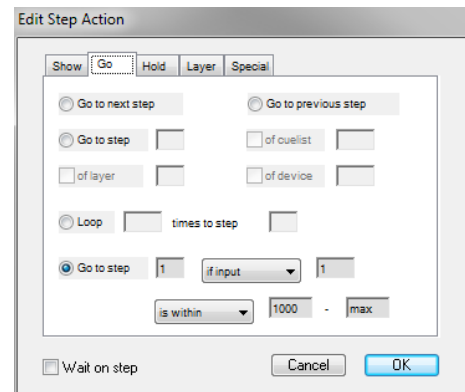


Image 70: Using the Analog Input in a Cue Step

**Situation:** We want to start 5 different Cue Lists (201 through 205), and select the Cue List using a rotary potentiometer connected to Analog Input 1. When the potentiometer is switched off, we want to stop everything, when it is on, we want to start Cue List 201, 202, 203, 204 or 205, depending on the value.

**Solution:** In Layer B we run a Cue List (200) which checks the value of Analog Input Channel 1 and starts Cue Lists in Layer A. If the value is 1023, we want Layer A to be cleared. In order to do that we start Cue List 0 there. Note that if we just kept checking the value, Cue Lists will be started over and over. That's why we have to put a precaution in the Cue List: go back to the 'check state' sequence only if the Input value is outside the specified range.

### Step

```
1>-- check i1
2 go .9 if input 1 within 1023 - max
3 go .12 if input 1 within 818 - 1022
4 go .15 if input 1 within 613 - 817
5 go .18 if input 1 within 408 - 612
6 go .21 if input 1 within 203 - 407
7 go .24 if input 1 within 0 - 202
8 -- start CL
9>go 0.0 in layer A
10>go .1 if input 1 within 0 - 1022
11 go .10
12>go 201.1 in layer A
13>go .1 if input 1 outside 818 - 1022
```

```
14 go .13
15>go 201.1 in layer A
16>go .1 if input 1 outside 613 - 817
17 go .16
18>go 201.1 in layer A
19>go .1 if input 1 outside 408 - 612
20 go .19
21>go 201.1 in layer A
22>go .1 if input 1 outside 203 - 407
23 go .22
24>go 201.1 in layer A
25>go .1 if input 1 within 203 - max
26 go .25
```

**Example:** Starting different Cue Lists with push buttons

**Situation:** We want to start 7 different Cue Lists (201 through 207) or switch them all off using 8 push buttons connected to Analog Inputs 1 - 8. Button 1 should start Cue List 201, 2 Cue List 202, etc. up to button 8 which should switch all the Cue Lists off.

**Solution:** In Layer B we run a Cue List (200) which checks the value of Analog Input Channels 1 - 8 and starts Cue Lists in Layer A. For every Analog Input, a high value (~1023) means the button is idle, a low value (~0) means it's pressed. To avoid a Cue List being started several times when a button is pressed (or 2 Cue Lists are attempted to be started simultaneously), we build in a sequence that checks if the button is let loose again.

Step	
1>go .10 if input 1 within 0 - 100	18 go .17
2 go .13 if input 2 within 0 - 100	19>go 204.1 in layer A
3 go .16 if input 3 within 0 - 100	20
4 go .19 if input 4 within 0 - 100	21 go .20
5 go .22 if input 5 within 0 - 100	22>go 205.1 in layer A
6 go .25 if input 6 within 0 - 100	23>go .1 if input 5 within 500 - max
7 go .28 if input 7 within 0 - 100	24 go .24
8 go .31 if input 8 within 0 - 100	25>go 206.1 in layer A
9 go .1	26>go .1 if input 6 within 500 - max
10>go 201.1 in Layer A	27 go .26
11>go .1 if input 1 within 500 - max	28>go 207.1 in layer A
12 go .11	29>go .1 if input 7 within 500 - max
13>go 202.1 in Layer A	30 go .29
14>go .1 if input 2 within 500 - max	31> go 0.0 in Layer A
15 go .14	32>go .1 if input 7 within 500 - max
16>go 203.1 in Layer A	33 go .32
17>go .1 if input 3 within 500 - max	

## Set up Digital Outputs

The LanBox-LCX has 8 TTL compatible Digital Outputs which can be used to trigger relays. The maximum load on each Digital Output is 20mA and the Output voltage can switch between 0V and 5V. Relays and LEDs can be connected to these ports directly (obviously taking voltage and amperage into account). In order to control the Digital Outputs, they should be linked to a Channel. This is done in the DigOut tab of the Global Settings (Tools → Global Settings..., Image 71). Here you can assign a Mixer Channel to each Digital Output by selecting the Output and entering a Mixer Channel in the number box below. It is possible to assign multiple Outputs to one Mixer Channel.

The value of the assigned Mixer Channel will determine the Digital Output state. If the Channel has a value of 128 or higher, the Output is switched On and have a voltage of 5V. At a value of 127 or less, the Output will switch Off.

The Mixer Channel assigned to a Digital Output can be programmed and used in the same way as any other Mixer Channel. Advised is to represent the Channel(s) by an On/Off Switch on the Stage.

## Using the Digital Output as a Serial Port

The LanBox-LCX can switch the Digital Outputs at such a speed that they can also be used as 9600 baud Serial Ports. In order to use them, the Digital Output should be linked to a Channel (see previous section) and the Channel should be set to either 0 or 255 depending on the serial protocol. The serial output can be used to send most RS232 commands. The Digital Output of the LanBox should be connected to the Data Deceive (Rx+) pin of the RS232 connector, and the 0V to the signal ground/common.

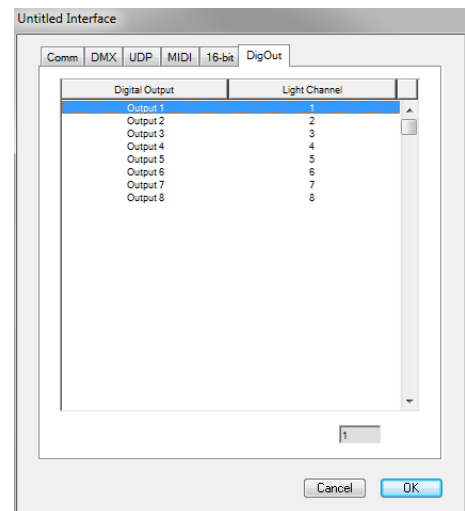


Image 71: Digital Outputs Setup

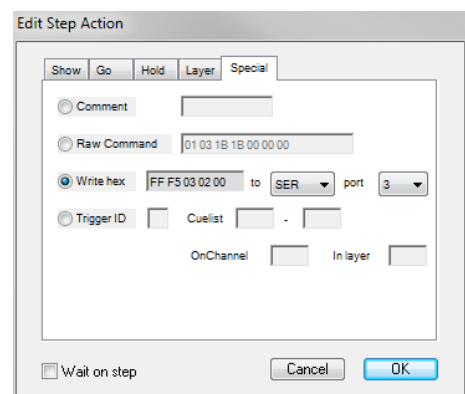


Image 72: Serial command Cue Step Action

In order to send serial commands, they will have to be programmed in Cue Steps, similar to the MIDI Out discussed on page 50. To program a Serial command, open a (new) Cue List in the Cue List Editor and double click on a Cue Step to open the Cue Step Action dialog. In the Special tab, we find the Write hex function (Image 72). To send a Hexadecimal command to a Digital Out port, select Ser in the drop down menu and select the appropriate Port Number. In the text box you can type the hexadecimal command. Although normally these are typed with upper case letters, they aren't case sensitive, LCedit+ will change lower case letters to upper case automatically. You can send a 5 byte message per LanBox frame (5ms). If your command is longer than 5 bytes, it will have to be split up in 5 byte chunks, separated by a 'hold for 0.05s' Cue Step to force the LanBox to wait until the next frame. If this isn't done, the new bytes will be sent and the previous sequence overwritten.

### Example

We have connected an iPod to Digital Output 3 of the LanBox. We want the LanBox to trigger the iPod to start playing if a push button connected to Analog Input 1 is pushed, and stop when a push button connected to Analog Input 2 is pushed. Digital Output is linked to Mixer Channel 3003 and we have looked up the Serial Commands for Play and Stop for the iPod. These are:

**Play:** FF 55 04 02 00 00 01 F9

**Stop:** FF 55 03 02 00 80 7B

And this one to make the iPod perform the action (it won't work without this command!):

**Button Release:** FF 55 03 03 00 00 FB

See Appendix II: iPod Serial Commands for the complete command Chart.

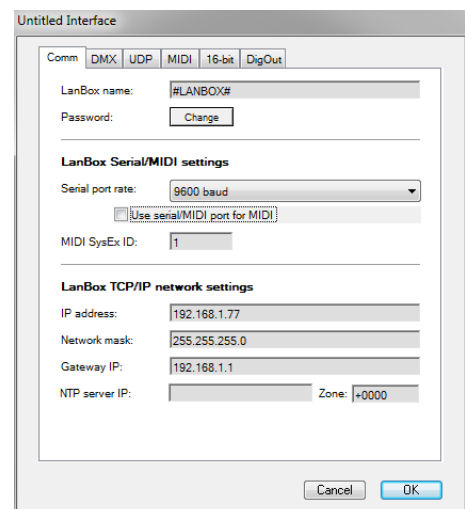
The Cue List will look like this:

Step	
1-- <i>BUTTON1</i>	18--
2> <i>go .9 if input 1 within 0 - 100</i>	19-- <i>STOP</i>
3 <i>go .2</i>	20> <i>write FF 55 03 02 00</i>
4-- <i>BUTTON2</i>	21 <i>hold for 0.05s</i>
5> <i>go .20 if input 2 within 0 - 100</i>	22 <i>write 80 7B to SER 1</i>
6 <i>go .5</i>	23 <i>hold for 0.05s</i>
7	24-- <i>RELEASE</i>
8 – <i>PLAY</i>	25 <i>write FF 55 03 03 00 to SER 1</i>
9> <i>write FF 55 04 02 00 to SER 1</i>	26 <i>hold for 0.05s</i>
10 <i>hold for 0.05s</i>	27 <i>write 00 FB to SER 1</i>
11 <i>write 00 01 F9 to SER 1</i>	28 <i>go .2</i>
17 <i>go .5</i>	

## Using the MIDI Port as a Serial Port

When the baud rate of the MIDI port is set to 9600, it can also be used as a Serial port. This can be done in the comm tab of the Global Settings window (Tools → Global Settings...). Uncheck the 'Use serial/MIDI port for MIDI' box and select 9600 baud as the Serial port rate (Image 73). Note that the LanBox will have to reboot if you change the baud rate of the MIDI port.

Pin 4 of the MIDI port corresponds with the Data Transmit of a serial port, pin 5 with the ground/common.



**Image 73: Setting the MIDI port as a serial port**

## 14 UDP Networking

The LanBox-LCX and LCE have several options for using UDP (User Datagram Protocol) to transfer data on an Ethernet network. UDP is a fast protocol that is very suitable for sending and receiving bulk data (such as DMX). UDP can be used to synchronize several LanBoxes and to capture or send DMX Data with third party software.

### Sending Channel data

To send your Channel data with UDP, this will have to be set up in the UDP tab of the Global Settings window (Tools → Global Settings...). Check the box 'Broadcast mixer channels:' and fill in the range of Channels you want to broadcast (Image 74). The UDP port is 4777 by default, but this can be changed into any required port number. Note that some UDP ports are reserved for use by other software and network protocols, so make sure you use a free port (this information is readily available on the internet).

It is also possible to broadcast the DMX Output and Input, the Analog Input values (ext input) and your Layer Information. These options can be used for other purposes explained in further sections.

In this example we have chosen to broadcast Mixer Channels 513 – 1024 ('DMX universe 2'), so it can be picked up by another LanBox.

Make sure that every LanBox in your network has an unique IP address!

### Receiving Channel data

To set up the receiving of Channel Data using UDP, open the UDP tab of the Global Settings window (Tools → Global Settings...). To receive Channel data a range of Channels has to be set which will be copied to the set Mixer Channels. The amount of Channels set in the 'copy light channels:' and in the 'to light channels:' boxes naturally have to be equal, which LCedit+ will make sure of when filling in the Channel numbers. You have the option to copy the Channel values either directly to the Mixer or to a Layer. When you copy the Channel values to a Layer these Channels will have to be activated in that Layer. Channels which aren't activated won't have the UDP values copied. This way you can choose which Channels you want to control in the LanBox, and which you want to copy directly (see also the section Use DMX Input values on page 51).

### Synchronizing multiple LanBoxes

Multiple LanBoxes can be set up to run synchronized, so if, for example, you start Cue List 1 in Layer A of the Master LanBox, the Slave LanBox shall do the same. To achieve this, in the UDP tab of the master LanBox Global Settings window, check the box 'Broadcast layer list'. This will make that LanBox broadcast all its Layer information over UDP. On the Slave LanBox, check the box 'Synchronize layers with the same ID' in the UDP tab of the Global Settings window. Now, this LanBox will perform all the Layer actions of the master LanBox, but only for Layers that share the same ID. This way it is possible to synchronize multiple DMX universes.

Note that this is especially useful if the amount of Cue Scene Data (the Channel values in the Cue Lists) threatens to be too large to be stored on a single LanBox. If this isn't the case, it is advisable to run all Cue Lists in one LanBox to ensure better timing and broadcast the Channel data only.

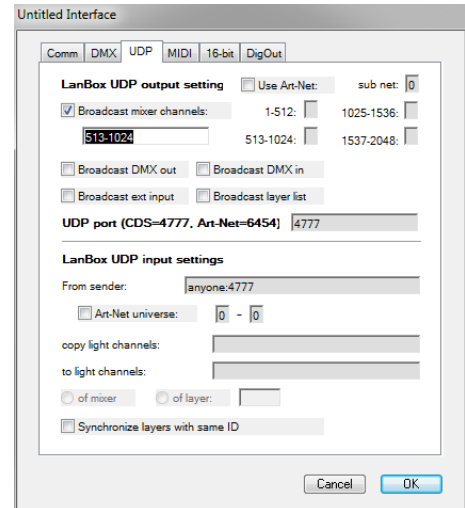


Image 74: Setting up Channel Broadcast

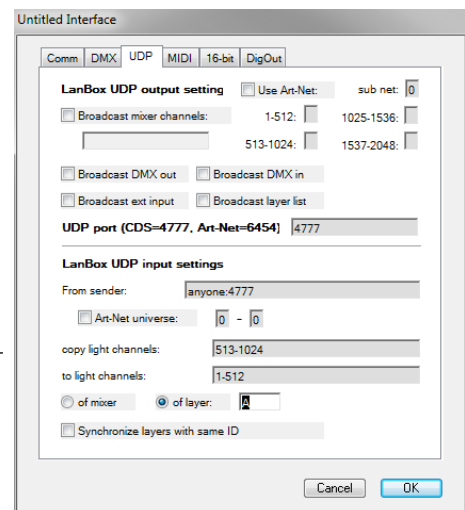


Image 75: Setting up Channel Receive

## Synchronizing with software

The UDP functions of the LanBox can be used to monitor the Channel data of the LanBox or to control its Channel values in a very direct way using third party software. In order to work with the LanBox UDP streams, an understanding of the stream format is required.

The general form of a LanBox UDP stream is as follows:

Header:

**C0 B7** **SEQU**

where: **SEQU** is the 16bit sequence number (sent by the LanBox but ignored when receiving)

One or more messages:

**MT BU LENG INDX** **<data>**

where: <b>MT</b>	Message Type.	<b>CA</b> for Buffer Write: ignores LanBox Settings and copies values directly to Buffer and Offset stated in the Message. <b>C9</b> for Buffer Broadcast: the LanBox copies Mixer buffer Data to Layer specified in UDP receive Settings <b>D1</b> for Layer Information Broadcast. <b>01 – 3F</b> (1 – 63) for Layer A – BK <b>FC</b> (252) for DMX Input <b>FD</b> (253) for Analog Input <b>FE</b> (254) for Mixer <b>FF</b> (255) for DMX Output
<b>BU</b>	Buffer ID (8bit)	
<b>LENG</b>	16bit message length in 8bit bytes (complete message, including <b>MT</b> , <b>BU</b> , <b>LENG</b> and <b>INDX</b> , excluding padding)	
<b>INDX</b>	16bit start index of the broadcast channels (only Message Type <b>CA</b> and <b>C9</b> )	
<b>&lt;data&gt;</b>	consists of <b>n</b> x 8bit values	

Note that the LanBox can transmit all Buffer ID types, but will only accept **01 – 3F** and **FE** (Layers and Mixer) as Buffer ID when receiving. If a message has an odd length, a padding byte is added to make sure that the next message will have a 16bit alignment.

### Supported software

The following software is known and tested to work with the LanBox.

#### Cycling 74 MAX

The standard MAX UDP objects are made to handle OSC messages, but by adding the argument lanbox they will receive the LanBox UDP stream as FullPacket messages. Use the LanBox specific Max externals (together with examples available for download on our website and included in the LCedit+ package) to decode and encode these messages.

#### Troikatronix Isadora

Isadora can convert its data to LanBox compatible UDP DMX data packets. Examples are available for download on our website and included in the LCedit+ package.

#### Capture by Capture Sweden

The Capture software by Capture Sweden supports the LanBox as input device. It supports up to 6 universes of DMX data. Set the LanBox to broadcast Mixer Channels 1-3072 to use all these universes.

## Art-Net support

Art-Net is a special protocol designed and copyrighted by Artistic License LTD which is based on UDP. Its purpose is to allow transfer of large amounts of DMX data over a wide area using standard networking technology. The LanBox can be set to send and receive DMX data in the Art-Net format in the UDP tab of the Global Settings window.

Note: by default, the Art-Net protocol uses IP addresses in the 2.x.x.x range. These can be valid Internet IP addresses as well. Only use these addresses when there is no connection to the internet! Use 10.x.x.x or 192.168.x.x addresses instead as these are reserved to be used in local networks.

### Broadcasting Art-Net

To set up Art-Net broadcast on the LanBox, open the UDP tab of the Global Settings window (**Tools → Global Settings...**). Check the box 'Use Art-Net'. The sub net number can be entered in the 'sub net' box in the top right and can have a value of 0 – F (0 – 16). Now you can assign a Universe number (0 – F as well) to 4 ranges of Mixer Channels (Image 76). Because Art-Net supports a maximum of 4 Universes from one source IP address, only the Mixer Channel 1 – 2048 can be linked to an Art-Net Universe. Note that the Universe numbers have to be increasingly and sequentially numbered (so Universe 0 for 1 – 512 and 1 for 513 – 1024 is OK, but not the other way around or 0 for 1 – 512 and 2 for 513 – 1024)! The numbers in the 'Broadcast mixer channels' box will change but this should be ignored. Note that the UDP port will automatically change in 6454, the Art-Net port.

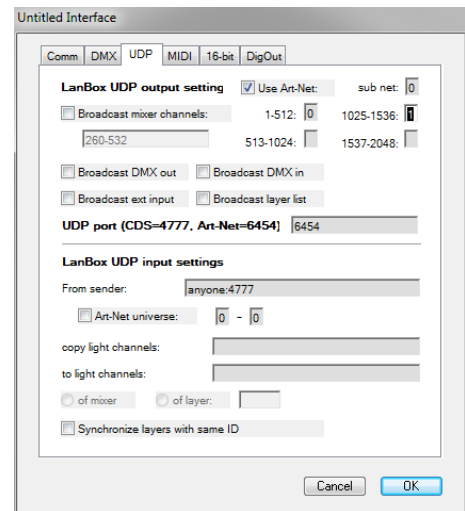


Image 76: Setup for broadcasting Art-Net

### Receiving Art-Net

The LanBox has the capability to copy the values of 1 Art-Net universe to a Layer or directly to the Mixer. In order to do this, open the UDP tab of the Global Settings window (**Tools → Global Settings...**). Check the option 'Art-Net universe: ' and fill in the sub net (0 – F, first number box) and universe (0 – F, second number box) from which you want to copy the DMX values (Image 77). The 'copy light channels' box will automatically select the DMX channels associated with the selected Universe and sub net. In the 'to light channels' box, fill in the range of Mixer Channels you want to copy the DMX values to. Note that this will always have to have a length of 512 channels.

You can choose to either copy the DMX values directly to the Mixer or to a specified Layer. When you copy the Channel values to a Layer these Channels will have to be activated in that Layer. Channels which aren't activated won't have the Art-Net values copied. This way you can choose which Channels you want to control in the LanBox, and which you want to copy directly (see also the section Use DMX Input values on page 51).

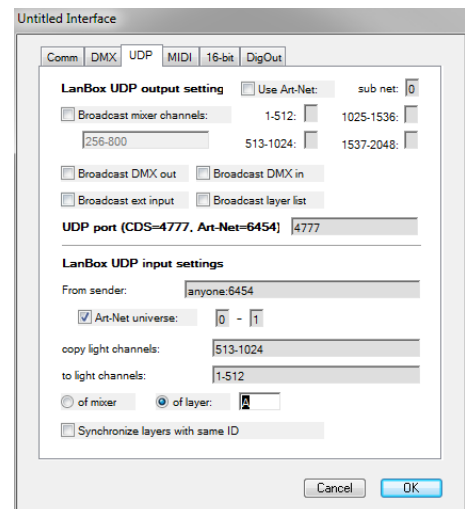


Image 77: Setup for receiving Art-Net

## 15 Advanced

### Backup and Restore

Using LCedit+ it is possible to backup the contents of the LanBox memory to upload it again later. Note that everything is stored except for the Layer information! A workaround for this is described further on in this section.

#### Making a backup

In order to make a backup, select **Tools → Backup...** in the menu. A Window will appear where you can give the backup a name and select which tables and Cue Lists you want to save (Image 78). Go through you Cue Lists thoroughly and deselect the Cue Lists you won't need to save. This will save you valuable LanBox memory capacity when you restore the backup later. This way, you can also choose only to backup a number of Cue Lists which you would like to copy to another LanBox.

Backup files are saved in the 'Backup Files' folder in the LCedit+ folder.

#### Restoring a backup

In order to restore a previously stored LanBox backup, select **Tools → Restore...** in the menu. A window will appear where you can select the backup you want to restore (Image 79). Choose the backup you want to restore and expand the backup item. LCedit+ will note restore the backup when the item is still collapsed! When the backup item is expanded, you can select which tables and Cue Lists you would like to upload to the LanBox.

Do not forget to save the LanBox Data after performing a backup restore!

#### Layer and Channel Information

The Layer and Channel information are not saved when you backup the LanBox. All these settings can also be applied through the use of Cue Step actions though. The easiest workaround therefore is to make one Cue List in which all Layer and Channel Settings are applied an backup this Cue List with the rest of the backup.

### Uploading firmware

Now and then there is a firmware update for the LanBox. These may contain new features or bug fixes. To upload new firmware, make sure you have the right version downloaded and unpacked. Note that the (P) version of the LCX firmware is a special version that blocks the possibility to change some vital settings using an Ethernet connection. This version is meant for situations where the LanBox is easily accessible through an Ethernet connection by many people (for instance an educational setup or our demo.lanbox.com). The current firmware version is displayed in the Interface status window in the Advanced Layer Options panel when connecting to the LanBox (Image 80).

To upload new firmware, select **Tools → Upload firmware...** in the menu. The Firmware upload window will appear. Select Upload and select the firmware file on your system. LCedit+ will attempt to connect to your LanBox and enter the Bootstrap mode to start uploading the new firmware. Do not interrupt this process! If the process is interrupted, a factory reset will have to be performed. When the firmware upload is completed, the Firmware upload window will show the text: "Firmware upload complete" (Image 81). Click OK to exit the Firmware upload window.

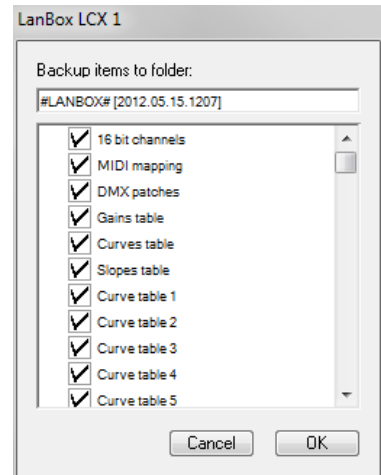


Image 78: LanBox backup window

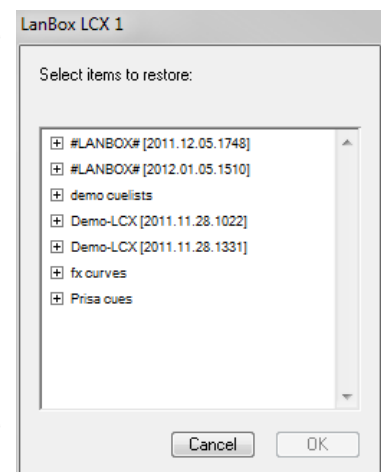


Image 79: The backup restore window

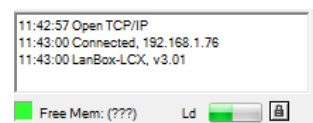


Image 80: The Interface Status Window

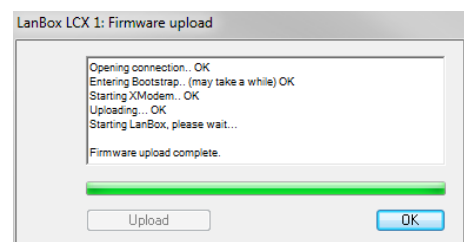


Image 81: The Firmware upload window

## LanBox Utilities

In the LanBox Utilities window you can query the memory status and a list of everything stored in the connected LanBoxes. To open the LanBox Utilities window, select **Tools → LanBox Utilities** in the menu. Clicking List will display the information of the active Interface (if you have more than one LanBox connected, select a Fixture on the other LanBox to switch between each LanBox). The window will display the amount of used and free memory in the selected LanBox, and a list of all the Cue Lists stored in it (Image 82). The Usage button has no function when using the LanBox LCX, LCE or LCM.

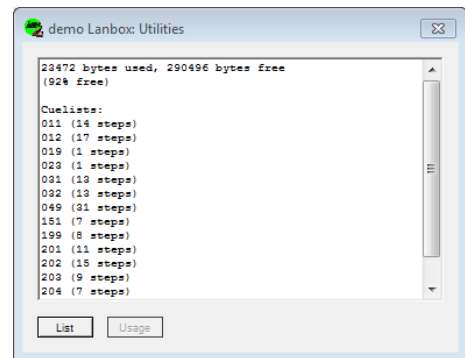


Image 82: The LanBox Utilities window

## Erase LanBox

With **Tools → Erase LanBox...**, you can erase all contents of the LanBox, and set all settings except for the name, network settings, password and baud rate to the factory defaults. This will delete all show data and this process may not be interrupted!

## Reboot LanBox

With **Tools → Reboot LanBox...**, you can perform a soft reboot of the LanBox. All unsaved data will be lost!

## Factory Reset

If the LanBox has been powered off while saving or during a firmware upload, its firmware may be corrupted and the LanBox will not boot properly any more. As a last resort you can perform a factory Reset, which will delete all data from the LanBox and set all settings to the default settings. Also if you have forgotten the password this is a way to reset it to 777 again (although not without losing all your data). To perform the factory reset it is required to open the LanBox. Remove the top cover by undoing the top two screws on both the front and the rear panel of the LanBox. Lift up the cover and locate the reset button (Image 83). To reset the LanBox, keep this button pressed for 15 seconds while powering up the LanBox (the button need to be pressed before powering up and has to be pressed continuously). Reboot the LanBox again and the LanBox should be reset to the factory defaults. This also means that the firmware is reset to the version originally installed. Upload new firmware when this wasn't the latest version.

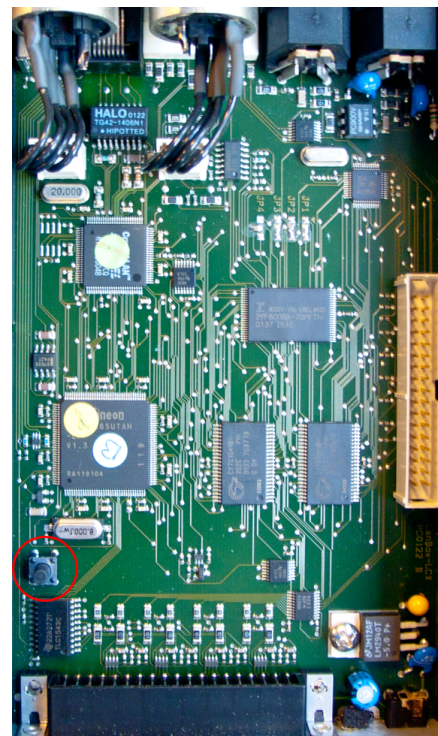


Image 83: The factory Reset button

## Connecting Multiple Interfaces

It is possible to connect to more than one LanBox at once inside one LCedit+ project. To connect to a second LanBox, the Interfaces window has to be opened and active (**Window → Interfaces**). With the Interfaces window active, select **Edit → New Interface...** to open a new Configure Interface window. Make sure to give every LanBox connection you make a unique name to avoid confusion.

To switch between each connected LanBox, place at least one Fixture on your stage for every interface (select the appropriate LanBox in the Interface drop down menu when creating a Fixture). The Control Panel and DMX Monitor will automatically switch to the LanBox associated with the selected Fixture on the Stage. The Cue List Editor can switch using the Interface drop down menu in the bottom right.

## Auto Update

In normal operation, LCedit+ automatically updates all its information as quickly as possible. In some circumstances though, this might not be desirable. To toggle the Auto Update, select **Tools → Auto Update** in the menu (Ctrl Alt + R / ⌘ + R). When deactivated, the LCedit+ will only update its information on demand. To Update, select **Tools → Update Now** or press Ctrl + R / ⌘ + R. The Auto Update state is saved with your project, so if it is switched off when you save your project, it will be disabled when you load it again as well!

## Debug Mode

If you switch LCedit+ into Debug Mode (**Tools → Debug Mode**) you add some extra diagnostic functions in LCedit+. These functions can be used for debugging, troubleshooting and development purposes.

### StreamWatcher

The StreamWatcher window displays all the communication between the LanBox and LCedit+. Make sure to switch Auto Update off before you open the StreamWatcher! If Auto Update is switched on, there will be continuous communication and you will not be able to see any useful data! To open the StreamWatcher, make sure LCedit+ is in Debug Mode and select **Window - > StreamWatcher**. Now you can see all the commands from LCedit+ (if you give one) and the answer from the LanBox. For the exact meaning of the commands, see the LanBox Reference documentation.

### Send Raw Command

With the Send Raw Command window, you can manually send commands to the LanBox and see the LanBox replies. To open the Send Raw Command window, make sure LCedit+ is in Debug Mode and select **Window - > Send Raw Command**. For the exact meaning of the commands, see the LanBox Reference documentation.

### Log to File

You can also monitor the communication between the LanBox and LCedit+ by logging it to a file. To do this, make sure LCedit+ is in Debug Mode and select **Tools - > Log to File**. Now, all the communication is logged to a text file. This file is saved when you disable the logging again (again with **Tools - > Log to File**). The log file is saved in the LCedit+ folder and is named Debug Stream Log. For the exact meaning of the commands, see the LanBox Reference documentation.

## LanBox firmware operation

In order to make complicated shows, it is useful to understand the order in which the LanBox performs its calculations. The order of calculations has been visualized in Image 84. The black vertical arrow represents the calculations made every LanBox frame, in that order. Note that the bottom Layer in the LanBox is processed first, the top Layer last.

The blue arrows represent the 'real time' streams. This data is copied to the appropriate buffer or Layer as soon as it arrives.

What is especially important to keep in mind is that first the Cue Step Action is performed in a Layer before the Channel Data is copied to the Mixer. This means that 'if channel' Cue Step Actions shouldn't be performed in the same Layer the Channel data is copied to, but at least one Layer up.

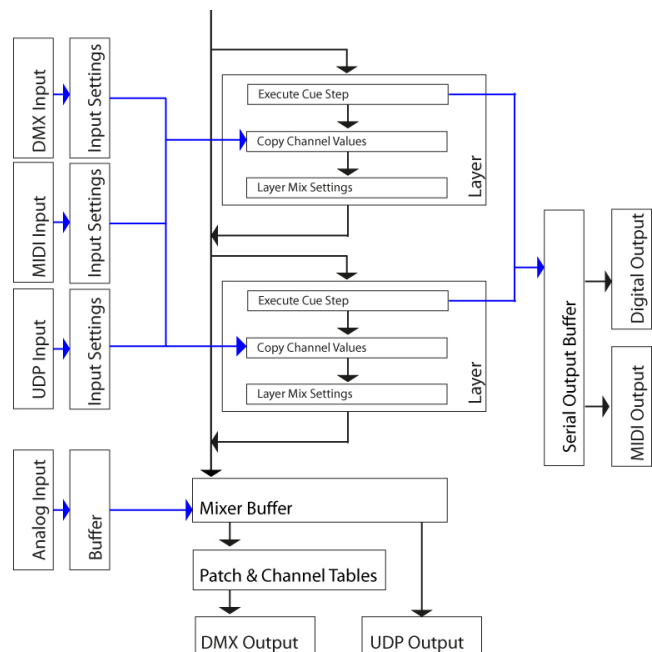


Image 84: LanBox firmware operation

## Appendix I: ColorSpot 250AT DMX chart

### Colorspot 250 AT-DMX Protocol-version 2.1

Mode/Channel				Value	Function	Type of control
1	2	3	4			
1	1	1	1	0-255	<b>Pan</b> Pan movement by 530°	proportional
2	2	2	2	0-255	<b>Pan fine</b> Fine control of pan movement	proportional
3	3	3	3	0-255	<b>Tilt</b> Tilt movement by 280°	proportional
4	4	4	4	0-255	<b>Tilt fine</b> Fine control of tilt movement	proportional
5	5	5	5	0 1-255 1-255	<b>Pan/Tilt speed , Pan/Tilt time</b> Max.speed (tracking mode) <i>P.T. speed- set Speed Mode in menu: P.t.Mo.</i> Speed from max. to min. (vector mode) <i>P.T. time - set Time Mode in menu: P.t.Mo.</i> Time from 0.1s to 25.5s. *	step proportional proportional
6	6	6	6	0-49	<b>Power/Special functions</b> <i>Reserved</i> <i>To activate following functions, stop in DMX value for at least 3 s and shutter must be closed at least 3 s. ("Shutter, Strobe" channel 16(13,18,15) must be at range:0-31 DMX). **</i>	step
				50-59 60-69 70-79 80-89 90-99 100-109 110-119 120-129	Pan/Tilt speed mode Pan/Tilt time mode Blackout while pan/tilt moving Disabled blackout while pan/tilt moving Blackout while colour wheel moving Disabled blackout while colour wheel moving Blackout while gobo wheel moving Disabled blackout while gobo wheel moving	step step step step step step step step
				130-139 140-149 150-159 160-169 170-179 180-189 190-199 200-209 210-229 230-239 240-255	<i>To activate following functions, stop in DMX value for at least 3 s.</i> Lamp On, reset (total reset except pan/tilt reset) Pan/Tilt reset Colour wheel reset Gobo wheel reset Dimmer/Strobe reset Focus reset Prism reset Total reset Reserved Lamp Off Reserved	step step step step step step step step step step step
		7	7	0-9 10-31 32-63 64-95 96-127 128-159 160-191 192-223 224-255	<b>Pan/Tilt macro selection</b> Disabled pan/tilt macro Reserved Figure of circle (from small to large) Figure of horizontal eight (from small to large) Figure of vertical eight (from small to large) Figure of rectangle (from small to large) Figure of triangle (from small to large) Figure of five-pointed star (from small to large) Figure of cross (from small to large)	step step proportional proportional proportional proportional proportional proportional proportional

source: [http://http://www.robe.cz/fileadmin/robe/downloads/dmx\\_charts/ColorSpot%20250%20AT%20DMX%20charts.pdf](http://http://www.robe.cz/fileadmin/robe/downloads/dmx_charts/ColorSpot%20250%20AT%20DMX%20charts.pdf)

Mode/Channel				Value	Function	Type of control
1	2	3	4			
		8	8	0 1-127 128-129 130-255	<b>Pan/Tilt macro speed</b> <i>Set pan/tilt speed (channel 5) to 0</i> No macro generation Macro generation from fast to slow -forwards No macro generation Macro generation from slow to fast- backwards	step proportional step proportional
7	7	9	9	0 11 23 34 46 58 70 81 93 105 117 128	<b>Colour wheel</b> <i>In range 0-128 DMX is possible fine colour positioning- set value on channel 8 (10)</i> Open/white Dark green Red Light azure Magenta UV filter Yellow Green Pink Blue Deep red White	proportional proportional proportional proportional proportional proportional proportional proportional proportional proportional proportional
				130-135 136-141 142-147 148-153 154-159 160-165 166-171 172-177 178-183 184-189 190-215 216-217 218-243 244-249 250-255	Dark green Red Light azure Magenta UV filter Yellow Green Pink Blue Deep red Forwards rainbow effect from fast to slow No rotation Backwards rainbow effect from slow to fast Random colour selection by audio control (Set microphone sensitivity in menu "Personality") Auto random colour selection from fast to slow	step step step step step step step step step proportional step proportional step proportional
8		10		0-255	<b>Colour wheel-fine positioning</b> Fine positioning	proportional
9	8	11	10	0-3 4-7 8-11 12-15 16-19 20-23 24-27 28-31  32-35 36-39 40-43 44-47 48-51	<b>Rotating gobo wheel</b> <b><i>Index - set indexing on channel 10 (9,12,11)</i></b> Open/hole Gobo 1 (15030016) Gobo 2 (15040011) Gobo 3 (15020137) Gobo 4 (15020138) Gobo 5 (15020139) Gobo 6 (15020140) Gobo 7 (15020141)  <b><i>Rotation - set rotation on channel 10 (9,12,11)</i></b> Gobo 1 Gobo 2 Gobo 3 Gobo 4 Gobo 5	step step step step step step step step  step step step step step

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Mode/Channel				Value	Function	Type of control
1	2	3	4			
				52-55 56-59	Gobo 6 Gobo 7	step step
				60-69 70-79 80-89 90-99 100-109 110-119 120-129	<b><i>Shaking gobos from slow to fast</i></b> <b><i>Index - set indexing on channel 10 (9,12,11)</i></b> Gobo 1 Gobo 2 Gobo 3 Gobo 4 Gobo 5 Gobo 6 Gobo 7	proportional proportional proportional proportional proportional proportional proportional
				130-139 140-149 150-159 160-169 170-179 180-189 190-199 200-201 202-221 222-223 224-243 244-249 250-255	<b><i>Shaking gobos from slow to fast</i></b> <b><i>Rotation - set rotation on channel 10 (9,12,11)</i></b> Gobo 1 Gobo 2 Gobo 3 Gobo 4 Gobo 5 Gobo 6 Gobo 7 Open/hole Forwards gobo wheel rotation from fast to slow No rotation Backwards gobo wheel rotation from slow to fast Random gobo selection by audio control (Set microphone sensitivity in menu "Personality") Auto random gobo selection from fast to slow	proportional proportional proportional proportional proportional proportional proportional step proportional proportional step proportional
10	9	12	11	0-255 0 1-127 128-129 130-255	<b>Gobo indexing and rotation</b> <b><i>Gobo indexing -set pos. on channel 9 (8,11,10)</i></b> Gobo indexing <b><i>Gobo rotation -set pos. on channel 9 (8,11,10)</i></b> No rotation Forwards gobo rotation from fast to slow No rotation Backwards gobo rotation from slow to fast	proportional step proportional step proportional
11		13		0-255	<b>Gobo fine indexing</b> <b>(set position on channel 9 (8,11,10))</b> Fine indexing	proportional
12	10	14	12	0-19 20-159 <b>160-255</b> 160-167 168-175 176-183 184-191 192-199 200-207 208-215 216-223 224-231 232-239	<b>Prism</b> Open position (hole) 3-facet rotating prism <b><i>Prism/gobo macros</i></b> Macro 1 Macro 2 Macro 3 Macro 4 Macro 5 Macro 6 Macro 7 Macro 8 Macro 9 Macro 10	step step <b>step</b> step step step step step step step step step

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Mode/Channel				Value	Function	Type of control
1	2	3	4			
				240-247 248-255	Macro 11 Macro 12	step step
13	11	15	13	0 1-127 128-129 130-255	<b>Prism rotation</b> No rotation Forwards rotation from fast to slow No rotation Backwards rotation from slow to fast	step proportional step proportional
14	12	16	14	0-255	<b>Focus</b> Coarse focus	proportional
15		17		0-255	<b>Focus fine</b> Fine focus adjustment	
16	13	18	15	0-31 32-63 64-95 96-127 128-143 144-159 160-191 192-223 224-255	<b>Shutter,Strobe</b> Shutter closed No function (shutter open) Strobe-effect from slow to fast No function (shutter open) Opening pulse in sequences from slow to fast Closing pulse in sequences from fast to slow No function (shutter open) Random strobe-effect from slow to fast No function (shutter open)	step step proportional step proportional proportional step proportional step
17	14	19	16	0-255	<b>Dimmer</b> Coarse gradual adjustment of the dimmer intensity from 0 to 100%	proportional
18		20		0-255	<b>Dimmer fine</b> Dimmer intensity fine	proportional

\* Short times are not used for long tracks( e.g. 0.5s for track 0-255 DMX).Times are restricted by mechanical parameters of the fixture.

\*\* The switch-functions have priority to the equivalent functions in menu "Personality"but the setting by DMX is not saved to the memory( after switching the fixture on,the setting from menu "Personality" is loaded and after that can be changed with DMX value on the channel 6).

<u>DMX protocol</u>	<u>menu "PerS"</u>
50-59 Pan/Tilt speed mode	P.t.Mo.-->SP.Mo.
60-69 Pan/Tilt time mode	P.t.Mo.-->ti.Mo.
70-79 Blackout while pan/tilt moving	A.blc.-->P.t.M.-->On
80-89 Disabled blackout while pan/tilt moving	A.blc.-->P.t.M.-->Off
90-99 Blackout while colour wheel moving	A.blc.-->Col.M.-->On
100-109 Disabled blackout while colour wheel moving	A.blc.-->Col.M.-->Off
110-119 Blackout while gobo wheel moving	A.blc.-->Gob.M.-->On
120-129 Disabled blackout while gobo wheel moving	A.blc.-->Gob.M.-->Off

source: [http://http://www.robe.cz/fileadmin/robe/downloads/dmx\\_charts/ColorSpot%20250%20AT%20DMX%20charts.pdf](http://http://www.robe.cz/fileadmin/robe/downloads/dmx_charts/ColorSpot%20250%20AT%20DMX%20charts.pdf)

## Appendix II: iPod Serial Commands

Each command is build up as follows:

Header	FF 55
A Length	1 byte
B Mode	02 (basic commands)
C Command	2 bytes, see list
D Parameter	Optional, depending on command
Checksum	0x100 - (Sum of length, mode, command and parameter) &0xFF

This results in the following commands:

Command	Header	length	mode	command	parameters	checksum
Button release	FF 55	03	02	00 00		FB
Play/Pause	FF 55	03	02	00 01		FA
Vol +	FF 55	03	02	00 02		F9
Vol -	FF 55	03	02	00 04		F7
Skip forward	FF 55	03	02	00 08		F3
Skip back	FF 55	03	02	00 10		EB
Next album	FF 55	03	02	00 20		DB
Prev. album	FF 55	03	02	00 40		BB
Stop	FF 55	03	02	00 80		7B
Play	FF 55	04	02	00 00	01	F9
Pause	FF 55	04	02	00 00	02	F8
Mute (toggle)	FF 55	04	02	00 00	04	F6
Next play list	FF 55	04	02	00 00	20	DA
Prev. play list	FF 55	04	02	00 00	40	BA
Shuffle (toggle)	FF 55	04	02	00 00	80	7A
Repeat (toggle)	FF 55	05	02	00 00	00 01	F8
Off	FF 55	05	02	00 00	00 04	F5
On	FF 55	05	02	00 00	00 08	F1
Menu button	FF 55	05	02	00 00	00 40	B9
OK	FF 55	05	02	00 00	00 80	79
Scroll up	FF 55	06	02	00 00	00 00 01	F7
Scroll down	FF 55	06	02	00 00	00 00 02	F6