ENTTEC

EMU – User Manual

Live Performance Lighting Control System for MacOS & Windows

EMU is a professional lighting control software designed for performers that lets you pre-program your entire light show in advance, letting you concentrate on your live performance.

You can manually step through the light show using EMU's clean, intuitive interface, MIDI notes, or EMU's VST3 plug-in to trigger your looks as part of your DAW playback! This is incredibly effective, as your light show automatically synchronizes to the performance, even if you change tempo live.

EMU allows you to focus on your performance with the confidence that all lighting will track your playback.

KEY FEATURES

- ▪ MacOS / Windows Compatible

- ▪ MIDI Integration

- ▪ VST3 Plug-in

- ▪ Sound tracker

- ▪ Hardware style interface

- ▪ Control any DMX512 fixture

- ▪ 1 Universe DMX Output through Art-Net or ENTTEC DMX USB Pro

Contents

Computer Requirements

Operating System

EMU is compatible with the following operating systems:

MacOS	MacOS High Sierra 10.13+ and above
	Windows 8
Windows (32 & 64 Bit)	Windows 8.1
	Windows 10

EMU requires .NET Core 3.1+ or higher to run. If your computer does not have .Netcore installed it can be downloaded from the Microsoft website at: https://dotnet.microsoft.com/download/dotnet-core

Minimum Recommended Computer Specification

Component	Mac	PC
Operating System	MacOS High Sierra 10.13	Windows 8
Processor (CPU)	Dual core 2 GHz CPU	Dual core 2 GHz CPU
RAM	4 GB RAM	4 GB RAM
Hard Drive	Mechanical HDD	Mechanical HDD

Recommended Computer Specification

Component	Mac	PC
Operating System	MacOS High Sierra 10.13 or higher	Windows 10
Processor (CPU)	Quad core 2.5 GHz CPU	Quad core 2.5 GHz CPU
RAM	8 GB RAM	8 GB RAM
Drive	SSD	SSD

The exact computer requirement depends on your intended use, For example, playing back multiple Oscillators at a high speed with heavy VST mapping will require far more computing power than manually toggling between your Programs using a MIDI Controller.

⚠️

- **Always factor in other software running on your computer and their usage of your system. When choosing a computer ENTTEC always recommends building in additional processing headroom for future software updates and to give you flexibility with your setup.**
- **ENTTEC do not recommend the use of older Mac devices featuring a 'fusion drive' for live performances.**

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Installing the Software

The EMU software installers is provided in the signup confirmation email. Sign up at https://www.enttec.com.au/apply-for-free-emu/. Download the relevant installer for your computer.

Run the installation process making sure that the installer is correctly referencing your VST Plug-ins folder on Windows, or you have located it in the correct folder in MacOS if you intend to run EMU with a DAW.
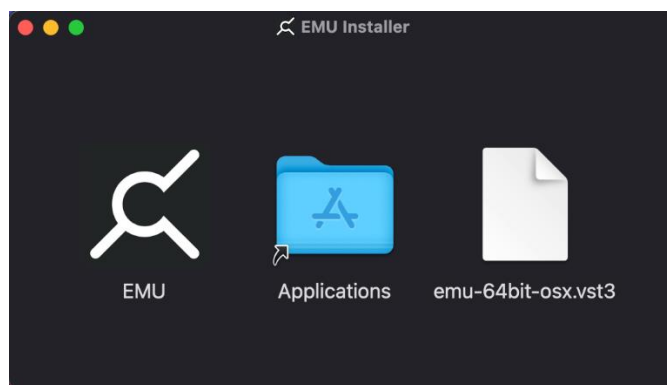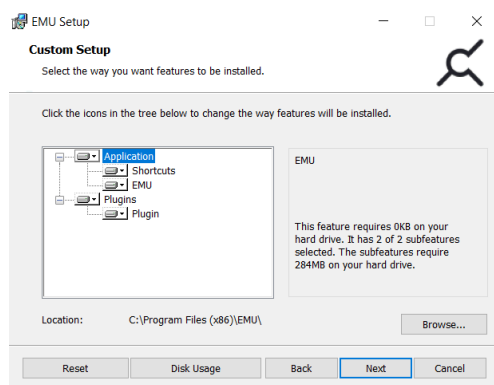
After completing installation, you may be prompted to update your lighting fixture library. This process requires an Internet connection and should not be interrupted. If you do not wish to do this, it is not an essential for the software to run.

If you plan on using ENTTEC DMX USB hardware, to output DMX from EMU, it's recommended that you Install **ENTTEC's Pro Manager** software onto your computer to ensure your DMX USB hardware is updated and configured to an output refresh rate that works with your lights. You will only be able to connect a DMX USB Pro to one application at a time. Therefore, you must ensure Pro Manager is closed whilst EMU is running and vice versa. – EMU does not support RDM.

Forum & Tech Support

Telephone and email support through ENTTEC's standard support channels are not offered for EMU at this time.

If you have any questions about using EMU or feature requests that are not covered within this manual, visit ENTTEC's Forum to find previous threads or raise a new request:

<p align="center">emulighting.com</p>

When raising a request, reporting a bug, or creating a support enquiry, include as much information as possible to allow ENTTEC's developers to understand and replicate what you are facing in addition to the desired outcome. – The clearer this information is, the faster a resolution can be found.

Reports should include:
- *Your Computer's Operating System & Version.*
- *EMU build number (Found by navigating to the Preferences Icon ⚙ > About)*
- *A detailed description of the issue / request.*
- *A screen recording, video or, screengrabs of the issue.*

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Licensing

EMU runs in **Demo Mode** when no license has been activated.

In Demo Mode, EMU's DMX output will drop all channels to **0% for 3 seconds every minute**, all other software functionality will operate as intended.

Activating an EMU License

Once you have an EMU license, copy it from either the email you received, or your ENTTEC account page and follow the steps below:

- Open EMU and ensure your computer is connected to the internet.

- Navigate to the **Preferences** menu by selecting the **gear icon** 🔧 at the top right of the interface, then select **License** tab.

- Select 'Change License Details' then enter the email address associated with your license voucher and paste your voucher code *(EMU is case sensitive, ensure this has been copied exactly including all dashes)*.

- Once 'OK' is pressed EMU will connect to the ENTTEC license server online and your license will be validated.
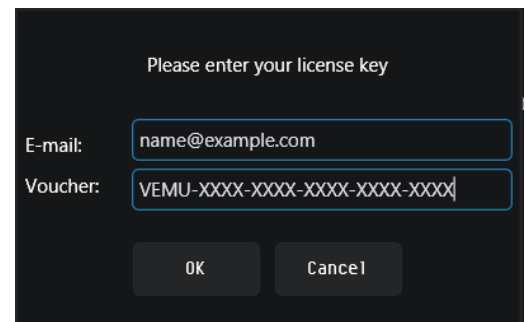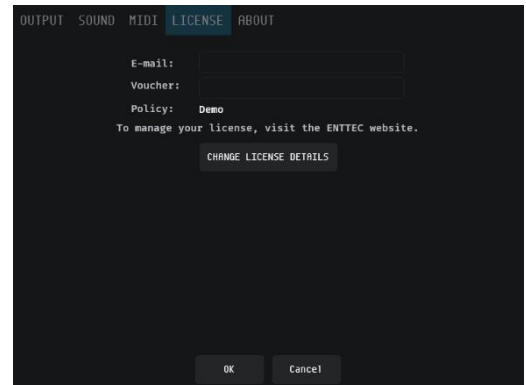
Note: Your computer must be connected to the internet at least once every **30 days** for EMU to contact the licensing server and validate your license.

Deactivating an EMU License

Open EMU ensuring your computer is connected to the internet then and navigate to the **Preferences** menu by selecting the **gear icon** 🔧 at the top right of the interface then select **License** tab and press **DEACTIVATE THIS MACHINE**.

This will return EMU to **Demo** mode.

Software Updates

To download the latest and greatest version of EMU, navigate to the EMU product page on ENTTEC's website and download the relevant installer for your operating system.

For best practice ENTTEC recommends that you export backups of your shows from the preferences menu before starting the update process.

*Instructions covering how to export an EMU showfile can be found in the **Shows** section of this manual.*

Will my lights work with EMU? (Fixture Library)

Whether you want to control LED washes, moving heads, dimmer packs, smoke machines, scanners, moonflowers, you name it, if they support either DMX or Art-Net input, the answer is YES, you can control them with EMU.

powered by
crescit

ENTTEC has partnered with **Crescit** to give EMU a leading fixture library that receives regular updates.

Crescit is a brand with a strong background in developing software to help professional lighting designers research, compile, manage and share production information.

With Crescit's vast library integrated into EMU this makes laboriously creating custom fixture profiles to control your equipment a thing of the past.

Crescit library endeavors to add all fixtures to their database.

What if my fixture is missing from EMU's fixture library?

Firstly, ensure you are running the latest licensed version of EMU with the latest fixture library installed and restart the EMU whilst connected to the internet to check for updates.

If a specific fixture file is missing from the library, Crescit endeavors to add all fixtures to their database and will be keen to add this for you. The team at Crescit require the following information to be provided alongside each fixture request to ensure the most efficient turnaround is possible:

- Product Manual
- Product Datasheet
- Web URL to the manufacturer's web page
- DMX Map (channel layout)

Please add this information to the **Fixture Library Requests** section in the EMU forum where the ENTTEC and Crescit team will be sure to gather all requests on a weekly basis.

The team at Crescit aims to turn around all fixture files within a week of creation providing all information is clear.

Downloading the Latest Fixture Library Version:

ENTTEC regularly updates EMU's fixture library with Crescit's latest fixture files.

If EMU is licensed and your computer is connected to the internet, when you start the application it will check for any fixture library updates and display a dialogue if one is available.

Options are available to either ignore or to begin the download.

If you select the option to download the latest version, EMU will display the progress in the bottom right of the screen.

Upon completion you will be prompted to save and restart the application for the new fixture library to be initialized.

Warning: Don't quit EMU during this download process. Quitting could result in the fixture library being half overwritten or deleted and the download process having to be re-started the next time you load EMU.

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What Hardware Works with EMU?

EMU supports ENTTEC's DMX USB hardware and one Art-Net output universe to control your lighting over a computer network, the following hardware is supported:

ENTTEC DMX USB Hardware

ENTTEC's DMX USB Interfaces have built a strong reputation for reliability and have earnt the position of being the industry standard for DMX USB devices.

Isolated ports mean that your computer will be protected from any stray voltage down your DMX line.

All ENTTEC DMX USB interfaces are powered directly from your computer's USB port.

If you find that your computer cannot provide sufficient power to the interface, we recommend connecting through an external powered USB hub.

Note: Only one USB DMX output device can be connected to EMU at a time.

DMX USB Pro (SKU:70304)	DMX USB Pro Mk2 (SKU: 70314)	DMXIS Hardware (SKU: 70570)
DMX Output	DMX Output from Port 1 only *EMU does not currently support ProMk2 MIDI*	DMX Output

DMX Ethernet Nodes

EMU is compatible with any Art-Net hardware or software applications that receive Art-Net to create a more flexible setup. ENTTEC are key industry leaders in DMX over Ethernet technology, use EMU with any of ENTTEC's products that support Art-Net -> DMX.

ODE Mk2 (70405)	Ethergate Mk3 (SKU: 70070)
DMX Output	DMX Output on two ports

How do I connect everything Up?

To connect your DMX lights to EMU, follow the steps below to create a simple setup.

Using an ENTTEC USB DMX Device	*Using an Art-Net Node*
	- Connect your computer running EMU to a network switch using a network cable. (The maximum cable run length you can achieve is 100m). – ENTTEC does not recommend using WiFi in performance scenarios.
- Connect your computer running EMU to your ENTTEC DMX USB hardware.	- Connect the network switch to your Art-Net Node configured to receive Art-Net and output DMX.

- Connect the DMX OUT connector of your ENTTEC USB DMX device to the DMX IN XLR connector of your first DMX lighting fixture. - *(you may need a 5*pin male to 3pin female adaptor (SKU: 70029) *if your lights have 3 pin DMX Connectors).*
- Connect the DMX OUT connector of the first fixture to the DMX IN connector of the second fixture. Continue connecting all remaining fixtures together in this daisy-chain fashion.
- Connect a DMX terminator plug (SKU: 79122/79123) to the DMX OUT connector of the last fixture. DMX terminators stops data reflections, which can cause problems in the DMX line, often stopping one light in the middle of the cable from working, whilst those on either side work perfectly. This is especially important for long cable runs.
- Finally set the DMX address of each of your lights making sure the DMX channels do not overlap.

DMX Pointers

When designing your lighting setup, be sure to factor in the pointers below:

- Always use DMX cabling instead of microphone cables to connect your lighting fixtures. Microphone cable is not designed to carry digital lighting data. If you have particularly long cable runs on stage, you may find that microphone cables cause random flickering or other issues with your lights.

- No more than 32 lighting fixtures or effects can be linked in a single DMX chain. If you require more devices to be linked or want to distribute DMX data with simpler shorter chains instead, use a DMX splitter such as ENTTEC's D-Split *(SKU: 70572/ 70575)* to easily branch your data to more locations.

Configuration

If you plan on using ENTTEC DMX USB hardware to output DMX from EMU, it's recommended that you Install **ENTTEC's Pro Manager** *software to ensure your DMX USB hardware is running the latest firmware version and configure an output refresh rate that works with your lights. – Users of the DMX USB Pro should run non-RDM firmware v1.44.*

To configure EMU's output settings to send DMX or Art-Net once your hardware is set up, Follow the steps under the **Preferences Window** section of this guide.

Software Walkthrough

The following section takes you through all key functionality within the software.

Preferences Window

The first step after creating a new show file is to configure EMU's preferences.

The preferences window allows you to configure EMU's inputs, outputs, sound settings, license information and view the version information of your build.

To open the preferences menu, navigate to the top right of the interface and select the 'Preferences' gear icon.

Output

EMU's Output window allows you to configure EMU to route DMX information to your real-world output hardware using either DMX or Art-Net.
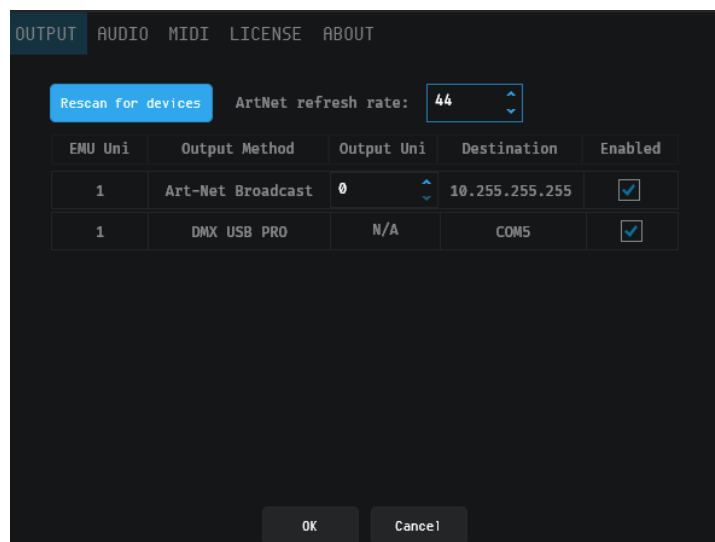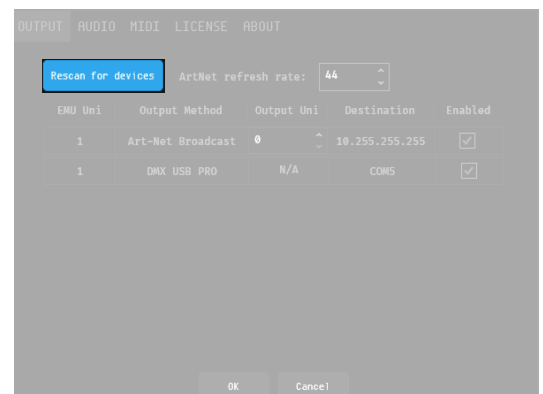
Key Feature Overview

Rescan for Devices

Before configuring your outputs, press **Rescan for devices** to ensure the list of output devices is up to date.

This button will re-scan for all compatible USB DMX output devices and poll all network adaptors to discover any Art-Net nodes using ArtPoll before updating the output table.
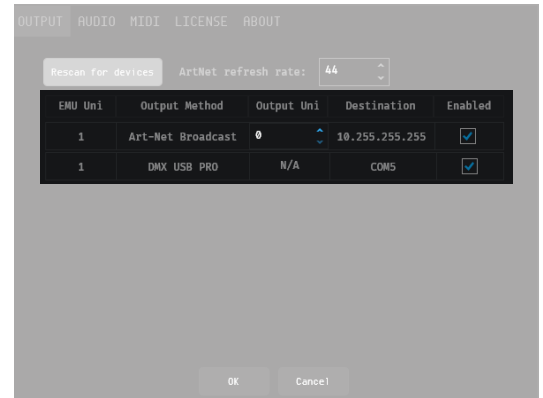
Output Table

The output table consolidates all output information to allow you to route data to your DMX output hardware.

When viewing the Output Table, the first column shows EMU's internal universes that your lights have been assigned to in the patch.

The steps below detail how to use the output table to configure an output for a DMX USB devices and / or Art-Net:

USB DMX Devices

To configure the output of a DMX USB device, simply locate it in the list, make sure it is set to the internal EMU universe (EMU Uni) you want to output and tick the **enabled** checkbox to begin outputting from your DMX USB Hardware.

| 1 | DMX USB PRO | N/A | COM5 | ☑ |
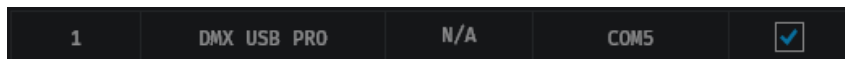
The Destination heading shows all COM or Virtual COM ports that EMU is using to communicate with the DMX USB hardware.

Modifying the refresh rate of an ENTTEC DMX USB Pro

Certain lighting fixtures may require a lower DMX refresh rate than the 44Hz defined in the DMX standard.

To modify the DMX refresh rate of a DMXIS, DMX USB Pro, or DMX USB Pro Mk2 device:
- Close EMU
- Open ENTTEC's **Pro Manager Software**
- Discover your ENTTEC USB device
- Navigate to the **Settings** page to configure the DMX refresh rate and other port specifics
- Save and close **Pro Manager**
- Open EMU

*Note:* Only one USB DMX output device can be connected to EMU at a time.

Art-Net

Art-Net Refresh Rate

The Art-Net refresh rate setting defines how many times a second EMU updates the Art-Net output per second.

By default, this is set to 44hz.

To reduce the computing power required by EMU, the Art-Net refresh rate can be reduced.
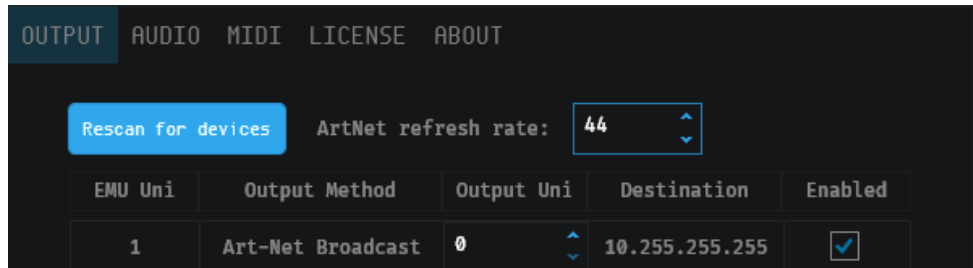
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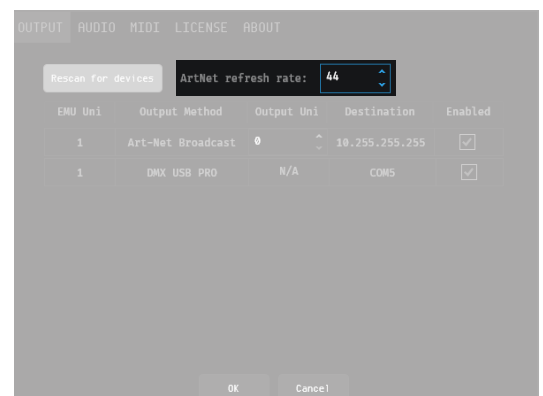
Art-Net Broadcast

In the output table, EMU, will display all network adaptors on your computer capable of Broadcasting Art-Net for each internal EMU universe.

Art-Net Broadcast sends your internal EMU universe of control data to all devices on the network in the same IP range.

To begin Broadcasting Art-Net from EMU, set the Art-Net output universe you want to transmit data on then tick the **Enabled** checkbox to begin sending data.

OUTPUT	AUDIO	MIDI	LICENSE	ABOUT		
Rescan for devices		ArtNet refresh rate:	44			
EMU Uni	Output Method	Output Uni		Destination	Enabled	
1	Art-Net Broadcast	0		10.255.255.255	☑	

Art-Net Unicast

If specific Art-Net devices are discovered on your network using ArtPoll, EMU will give the option to unicast to them.

When unicasting, EMU only sends the universe of Art-Net data to one device on your network.

1	ARTNET UNICAST	0	10.0.0.11	☑

Note: To ensure perfect synchronization your Art-Net devices:
- o Never Unicast to multiple Art-Net devices on the network adaptor and output universe (use **Broadcast** instead for the best synchronization).
- o Never Unicast to an Art-Net device over the same network adaptor and output universe that is already receiving Broadcast Art-Net data.
- o Do not send Art-Net over WiFi for live performances – rely on physical cables only.

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DMX USB / Art-Net Output Troubleshooting:

Only one piece of software connecting to an ENTTEC DMX USB Device or Art-Net Universe should ever be active on a single computer at a time, (this includes ENTTEC's EMU, Pro Manager, NMU and ELM software and any other 3rd party application).

If you have multiple pieces of DMX software open, they could compete for your DMX USB device or occupy the network port settings required by EMU to output Art-Net resulting in **Output Error** dialogues.

If you realize you have more than one piece of software using these resources, close all other software besides EMU, and press the 'Rescan for devices' button before disabling and re-enabling each output.

Firewall MacOS – To receive an ArtPoll response in MacOS the firewall must be turned off to accept broadcast packets.

MIDI Configuration

EMU can be configured to receive a MIDI channel from a single source that can be used to map external MIDI controls from DAW's or MIDI hardware to Faders, Buttons and Rotary Dials to control your show.

Additionally, EMU can use MIDI to control the Speed (BPM) dial through either MIDI Clock or Tap Tempo on CC 103).

EMU works with all class compliant MIDI devices.
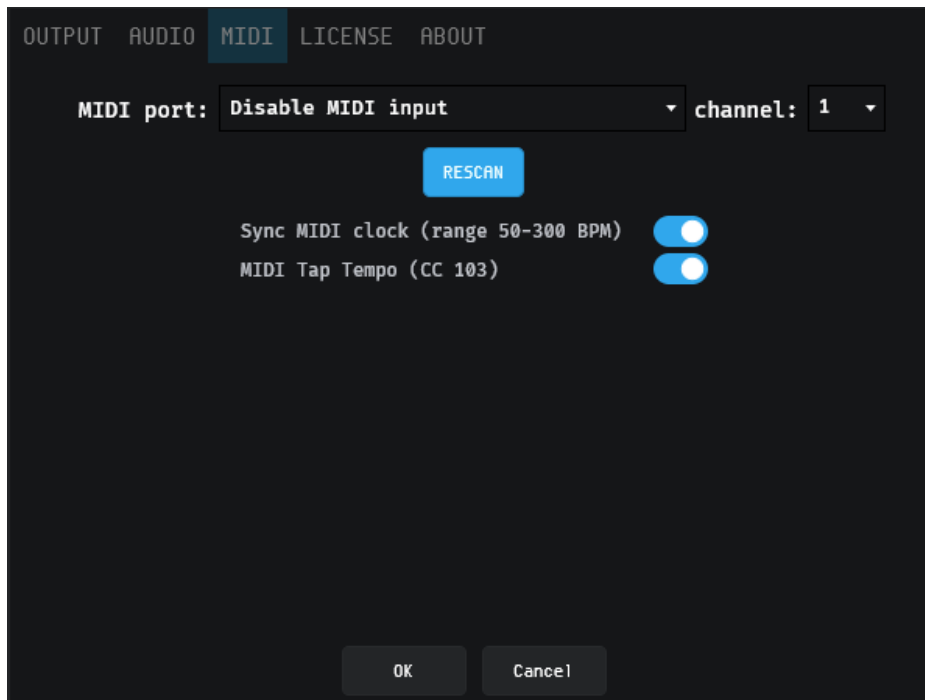
Simply connect your MIDI hardware or enable your virtual MIDI driver then press **RESCAN** within EMU to ensure it shows in the **MIDI port** list before selecting it and pressing OK at the bottom of the dialogue.

For details on how to Map MIDI to Faders and Controls see the **MIDI Mapping** section within in this manual.

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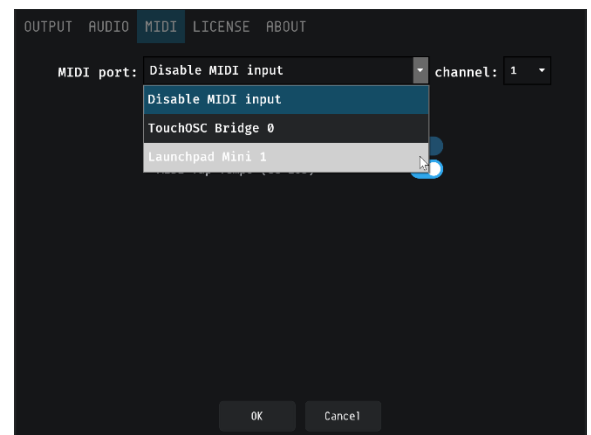
MIDI Connectivity FAQ

How do I send MIDI from one application to EMU on the same computer?

This is a useful feature when running a DAW on the same computer as EMU that you want to send MIDI with. Steps to achieve this on each OS are defined below:

MacOS

On MacOS use Apple's native IAC Driver to let MIDI apps transfer information to each other on the same computer.

To allow MIDI apps to transfer information on MacOS, you need to set up at least one MIDI bus in the IAC Driver (sometimes referred to as a MIDI port). Each application that sends MIDI will reference this bus as a destination to send information and other apps use it as a source, to receive information.

1) In the Audio MIDI Setup app 🎹 on your Mac, choose Window > Show MIDI Studio.
2) In the MIDI Studio window, double-click the IAC Driver.
3) In the Properties window, select "Device is online" to turn on the driver.
4) To set up the ports, do any of the following:
- *Add a bus*: Click the Add button ＋ below the list of ports.
- *Rename a bus*: Double-click the bus in the list, enter the new name, then press the Return key.
- *Remove a bus*: Select the bus in the list, then click the Remove button ─.
5) Select the bus you want to use to transfer information, then specify the number of MIDI In and MIDI Out connectors.
6) Click Apply.

Windows

Windows does not include a native virtual MIDI driver, but there are a number of 3rd party options available for free:

- **MIDI Yoke**, as a part of the MIDI OX Utility, is probably the best-known Windows equivalent to MacOS's IAC Bus. (***Note:*** *this utility is 32bit only, so may not work as intended with all 64-bit software, always check).*
- RTP loopMIDI Utility developed by Tobias Erichsen.

How do I configure a MIDI input from another computer over a Network?

Setting up a MIDI session on your local computer network is the most effective way to transmit MIDI Note, MIDI Control Change and MIDI Clock messages between computers.

For example, you might have a MIDI keyboard or launchpad connected to one computer that you want to use to use to change between the next and previous Program in EMU.

you can use a MIDI network driver to route the data from those devices to and from your computers over an Ethernet network. With the MIDI network drivers, you are required to configure a central computer to act as the *master*, sending and receiving MIDI data over the network to other computers and their connected MIDI devices to rote into EMU.

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MacOS

Use Apple's MIDI network driver to send and receive MIDI information between computers over a network.

To set up MIDI networking on your Mac, you first create a *session*, which identifies your Mac as a central location for MIDI streaming over the network.

When setting up a session on your Mac, specify the computer port that the network information uses, a session name and your computer's name to be seen by other computers on the network.

Full instructions of how to set up Apple's MIDI Network driver can be found at the link below:

https://support.apple.com/en-gb/guide/audio-midi-setup/ams1012/mac

Windows:

MIDI network sessions are not supported natively by Windows. You will be required to install a 3rd party virtual MIDI software such as Tobias Erichsen's RTP-MIDI utility.

RTP-MIDI is a Windows implementation of Apple's RTP-MIDI driver. This allows you to create, join or add devices to a MIDI network session that is compatible with MacOS devices thanks to its 'Bonjour' compatibility.

Similarly to Apple's driver, the RTP-MIDI driver creates virtual MIDI ports, which become visible to any MIDI application running on the PC you wish to send commands to.

## Can I send MIDI from multiple physical sources to EMU at once?

EMU supports one MIDI input and channel at a time. If multiple physical MIDI inputs are required, ENTTEC recommends the use of 3rd party MIDI translator software to merge or compile multiple MIDI channels and notes onto the same channel and input to be accepted by EMU.

If pared with a virtual MIDI loopback adaptor this can all be achieved on the same computer.

Note: EMU does not currently support the ENTTEC DMX USB Pro Mk2's MIDI implementation.

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Audio

The sound options within EMU to allow an input to be defined, configured and sent to EMU's sound tracker.
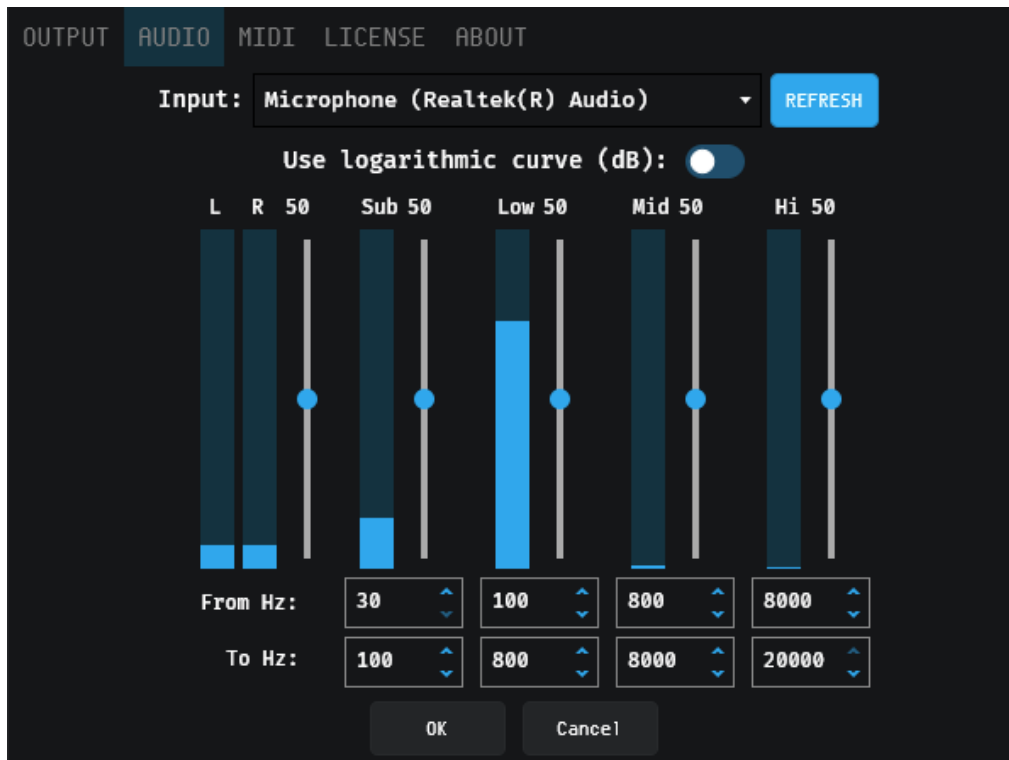

Audio input is taken by summing the total of each of the Stereo (Left + Right) channels at a sample rate of 48kHz

If a new audio source is connected to your computer, press **Refresh** for EMU to discover all virtual or physical audio sources and add them to the dropdown.

If the audio source is unplugged or disabled EMU will release it and automatically refresh the list.

The human perception of loudness is not linear, it's logarithmic. EMU's **Use logarithmic curve** option sets the Sound Tracker to respond in a format to match human hearing based on a logarithmic curve. When disabled, EMU uses a linear scale.
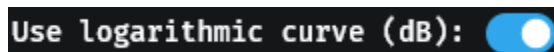
Four discrete frequency bands can be defined for EMU's sound tracker faders to respond to.

Each frequency band has a level controller. By default all bands are set to 50% level. Above this

By default each band is set to:

	Frequency Band			
	Sub	Low	Mid	Hi
Lower bound (Hz)	30	100	800	8000
Upper bound (Hz)	100	800	8000	20000

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Audio FAQ

How do I route audio playing on my computer back into EMU?

There are two main methods for routing audio between 3rd party applications and EMU that are running on the same computer. Routing audio can be used for things like, sampling audio being played back from DAW (Digital Audio Workstaion) or audio from a video stream.

Virtual Routing
Various virtual 3rd party audio-routing applications exist for MacOS and Windows. Some the most popular options are listed below:

- iShowU Audio Capture (Mac only)
- Soundflower (Mac only)
- Black Hole (Mac only)
- Rogue Amoeba Loopback (Mac only)
- Jack (Windows and Mac)
- VoiceMeeter (Windows)

Follow the 3rd party instructions for installation. Once installed, these will show up as audio drivers in EMU's Preferences>Audio dropdown preferences (as well as the preferences of other audio-enabled applications).

Analog Routing
If you are using a physical sound card or and have a spare output on your audio interface, connect a cable (or set of cables) from there to an input on the same interface.

Configure the audio interface preferences so that one Program is outputting via the analog out, and the other is set to receive the analog input. This option is by far the simplest

## Can I send multiple audio inputs into EMU at once?

EMU supports a maximum of one stereo input at a time which is averaged before each band and sampled at 48KHz. To input multiple inputs to virtual mixer software capable of mixing all audio sources to a single stereo feed or using a physical mixer to combine all audio sources to a single stereo feed to be received by EMU.

Can I define different EQ settings per Program?

You can set different **Sound Tracker** settings on a Per Program basis but not the Global EQ settings.

License

The license tab is the location in EMU where your license can be managed.
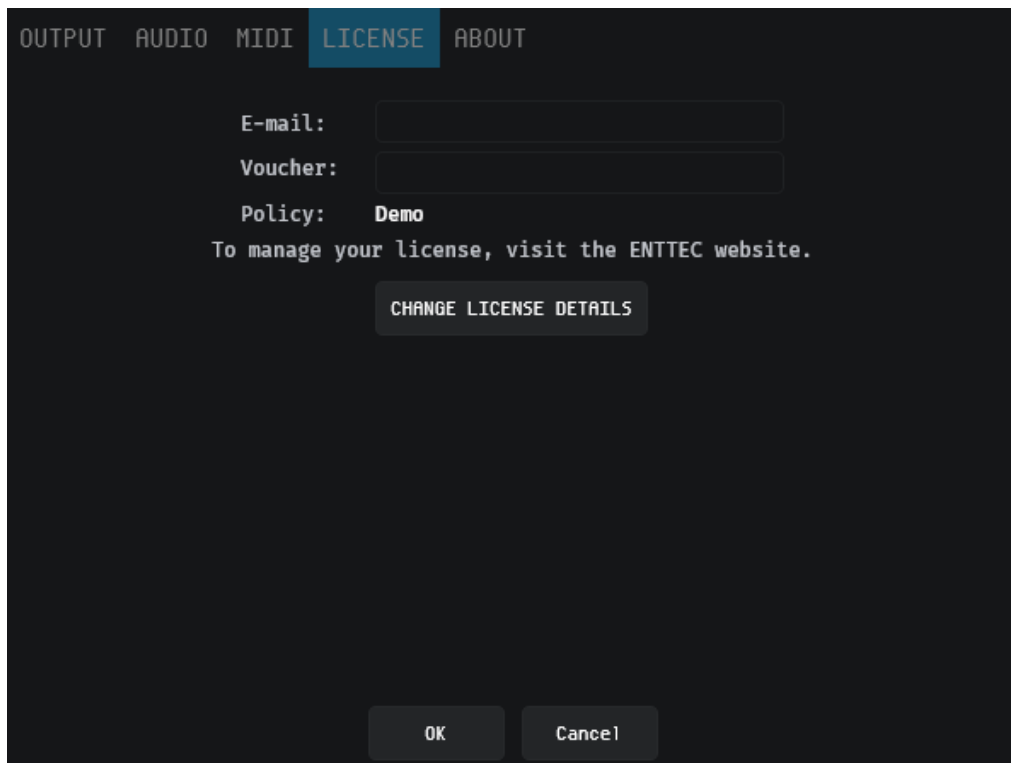

The License tab allows you to achieve the following:

- De-activate a license on your computer.
- Check for when your computer needs to be connected to the internet to validate your license.

For a detailed guide of how to license and manage EMU, see the **Licensing EMU** section at the beginning of this manual.

Note: Your computer must be connected to the internet at least once every 30 days for EMU to contact the licensing server and validate your license.

About

The about tab gives EMU's version information. If requesting support or reporting a bug, be sure to quote the build number along with all other information included in the **Forum & Tech Support** section of this manual to allow the developers to best replicate your setup.
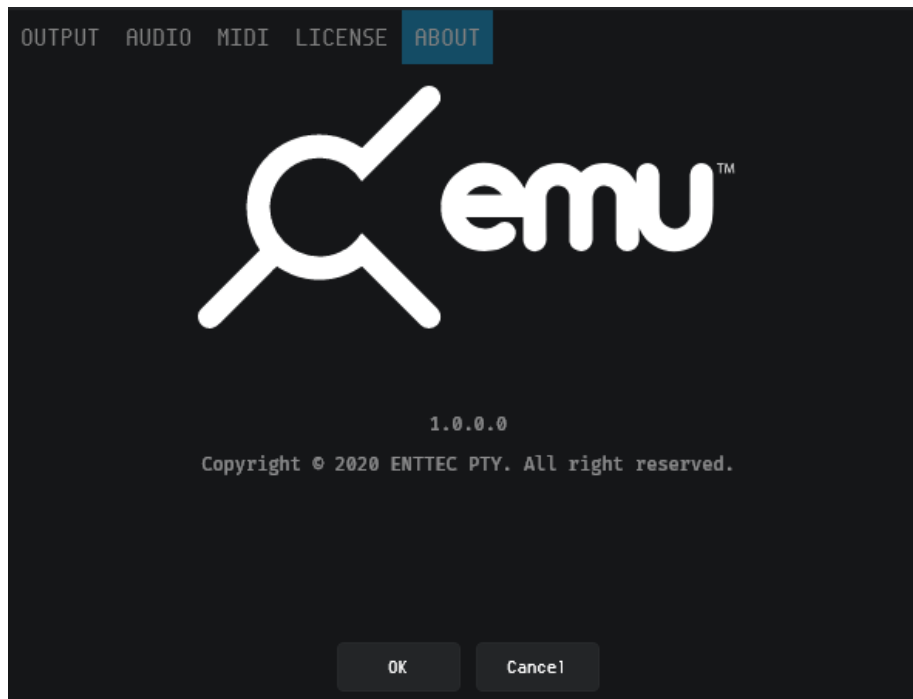
Patch Window

Patching fixtures is the first step of creating a new show in ELM. The Patch window provides a visual method of searching for and mapping your lighting fixtures in ELM to match the DMX addresses you have set your on your lights in the real world so ELM can control them.

Firstly, navigate to the **Patch** menu at the top right of the EMU software.
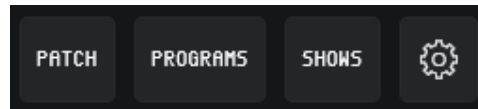
The bulk of this view is taken up by the patch grid. This contains 512 squares numbered 1 to 512. Each of these squares represents a DMX channel of EMU's 1 universe DMX output.
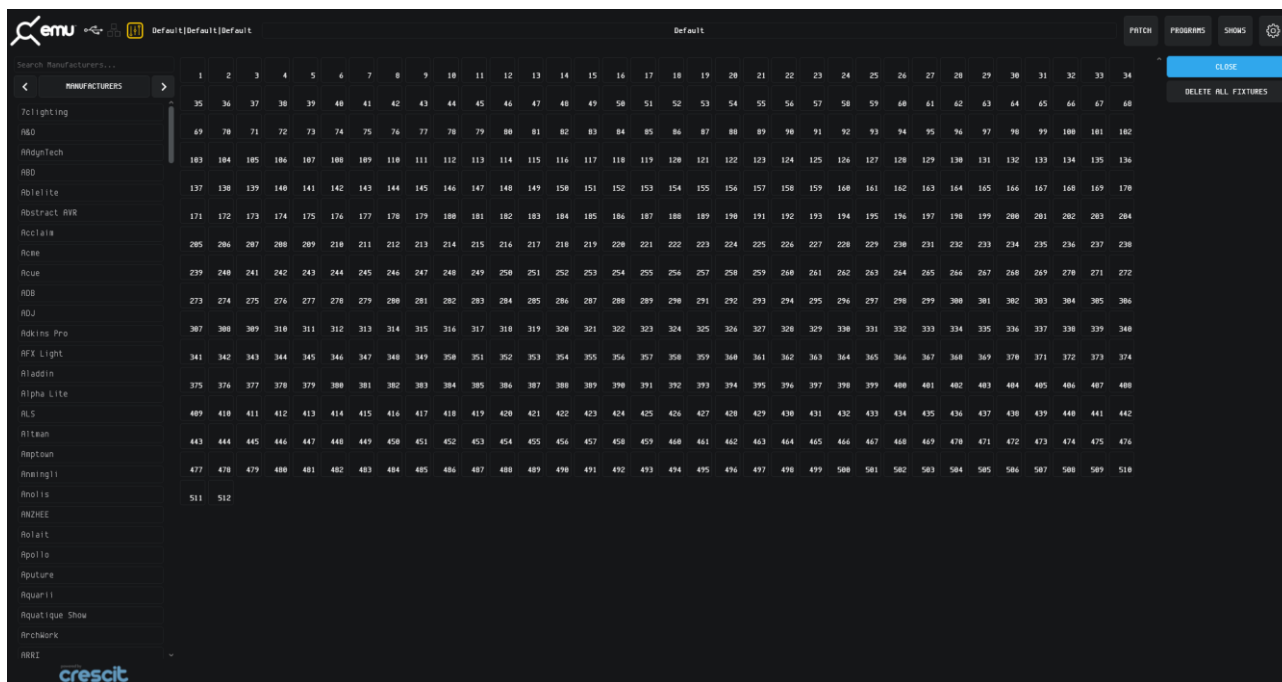
Patching a Fixture

The left-hand side of EMU's patch interface lists all DMX lights in alphabetical order– All lights are organized in the following hierarchy:

Manufacturers > Fixtures > Modes

Either scroll through the list to find the item you are looking for, or filter the list using the search box and select the item with your cursor to be taken to the next step in the folder hierarchy.

If your light contains typical features i.e. an RGB or RGBW wash, the fixture profile of a 'generic' fixture can be used.

(*Note:* *manufacturers with a high number of fixture models may take up to 30 seconds to fully initialize, whilst fixtures are loaded 'Please Wait...' will be displayed at the bottom of the list*).

Once you have found the fixture mode you require, select and drag it onto the patch grid. This will highlight available positions in the patch grid in light gray.

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The quantity of Light gray squares will match the DMX footprint of your lighting fixture, i.e. if your fixture has 3 DMX channels, when dragging it over the patch grid 3 gray boxes will be shown.
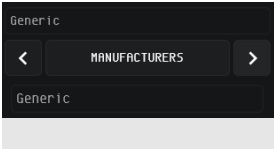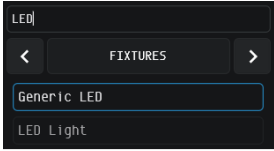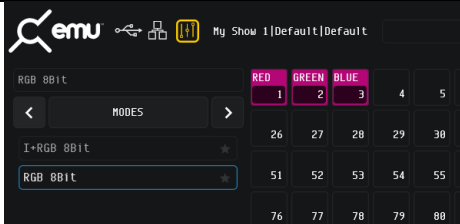

EMU will block you from overlapping lighting fixtures and warn you of an overlap by turning these squares red.


Release your cursor to patch the fixture onto the DMX channels shown on the grid. Once patched, each fixture is assigned a unique colour.

Example

The example below shows the steps to filter the fixture list and patch a: *Generic LED RGB Wash with 8Bit dimming:*

Filter by Manufacturer and select the one you want.	Filter by Model and select the one you want.	Filter by Mode and select the one you want.	Drag the fixture to the patch grid and release it over the channels required:

Once the fixture is patched, navigate back up the folder hierarchy using the back arrows to navigate to the rest of your fixtures.
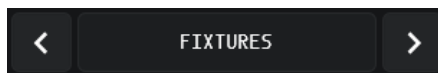

Each fixture is assigned a unique color on the patch grid. When selected, its channel order details will be shown on the bottom right of the interface.

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Changing the DMX Address & Viewing Details of a Patched Fixture

To modify the DMX address of a patched fixture, simply left click on it to select it (it will have a blue border). Then drag it to a new position on the grid.

To view details about a fixture, select it within the patch grid. Once selected, it's model and channel order details will be shown at the bottom right of the interface alongside the option to duplicate it to create multiple occurrences quickly.
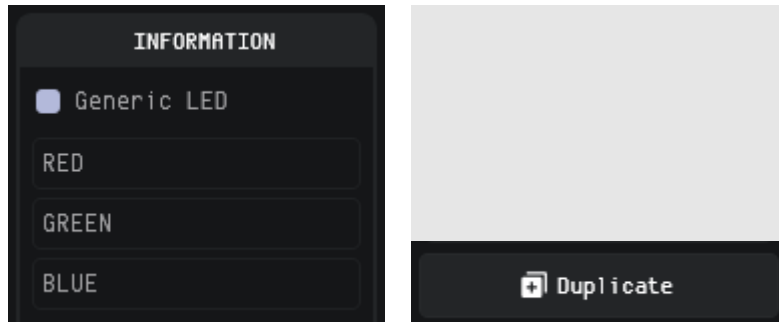

Adding a Fixture to Favorites

If you plan to regularly add the same fixture in a certain mode to your show files, it can be marked as a favorite to give much faster access.

Favorites will be remembered by EMU even when creating a new show to give you fast access.

To mark a fixture mode as a favorite simply left click on the star icon after locating it in the fixture list.

All favorited fixtures will be shown in the **favorites** list on the right-hand side of the patch view.
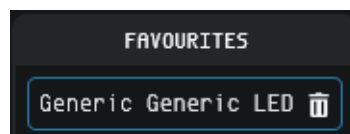
To patch a fixture from **favourites**, simply select and drag it onto to the patch grid in the same way you would any other fixture.

To remove a fixture from your favorites, press the trash icon to the right-hand side of each fixture.

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Deleting Fixtures from the Patch

To delete a fixture from the patch, left click on the fixture to select it then click the Delete button at the bottom right corner of the interface then confirm the delete dialogue.

To delete all fixtures from your patch grid and start patching from the beginning, use the 'Delete all fixtures' command at the top right of the interface, then confirm the delete dialogue.

Warning: deleting cannot be undone.

Exiting the Patch Window

Once you have completed patching your fixtures, navigate to the top right of the screen and close the patch window.

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Selection Logic

Selection is key to using EMU's interface. To quickly deselect all fixtures and attribute faders, click in any grey space around the Interface not occupied by a fixture.

The table below shows selection interaction with a 'Generic LED RGBW' wash light fixture.

State	Description	Graphic
Nothing Selected	Default state, nothing selected	
Fixture Selected	Clicking on the border selects the entire fixture. *When a fixture is selected, options including **macros**, and **position** can be applied.*	
Attribute Fader Selected	Clicking on an attribute fader once will select it, *(selected channels are highlighted in a lighter shade).* Clicking once more will deselect it. Once a fader Is selected, the fixture It Is a part of will also be selected. *When a fader is selected, options including **Oscillators**, sound tracker can be applied.*	

Selection Shortcuts

|	
Shift + Click	To select a sequential range of channels, click on the first fader, hold shift then click on the last fader.
Ctrl/CMD + Click	To select multiple Individual fixtures or faders, hold Ctrl / CMD and click on each of the Items you want. moving a selected fader will move all others.
Ctrl/CMD + A	Select all Fixtures
Alt + Click	To select **all** of the same attribute faders at once identical fixture types, hold **Alt** and select the range. This shortcut Is Incredibly useful when you need to make identical changes to the same fixture type at once. *i.e. selecting all Pan channels of a specific fixture type to apply a fan macro.*
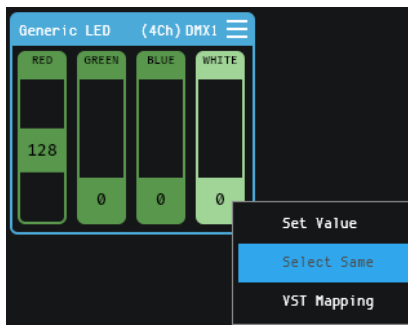
Note: you cannot combine **'Shift'** / **'Ctrl/CMD'** & **'Alt'** shortcuts to select multiple fixtures or attribute faders at once.

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Tools & Indicators

Connection Indicators

The top left of the Fixtures View contains indicators to show DMX USB and Art-Net Network connectivity. The states are as follows:

DMX USB Output Device Connected	
DMX USB Output Device Disconnected	
Art-Net Network Connected	
Art-Net Network Disconnected	

Active Program Indicator

EMU Showfiles contain Banks and Programs, these are the fundamental building blocks of any light show programed using EMU (see the Banks & Programs section of this guide for further information). Each EMU Showfile how can contain multiple Banks, and each Bank an contain multiple Programs.

The current Showfile, Bank and Program selection is shown in the top left corner of the interface:

Showfile	Bank	Program
My Show|Song 1|Chorus

Interface View Options

Interface view options allow for EMU's interface to be customized to best suit how you are using EMU's interface.

Zoom

When activated the Zoom icon enables the zoom side bar which allows the size of EMU's to be modified to show as many or few fixtures as required.

Default View	**Zoom Bar Enabled**
	Zoom Min.
	Zoom Max.

Expanded Fixture View

Enabling Expanded Fixture View hides all control widgets. – This is ideal for visualizing what your faders are doing when mapping them directly to an external control source such as MIDI or automation from a VST all within one Window.

Default View	Expanded Fixture View
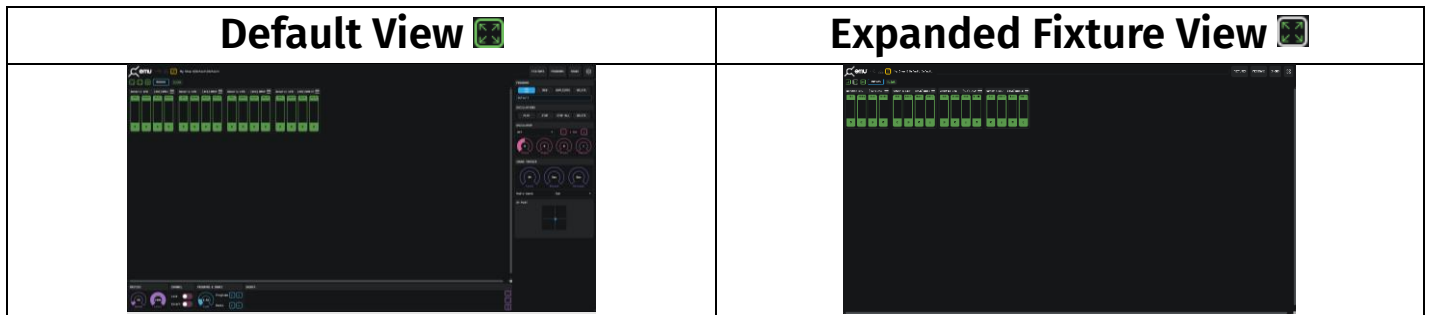
Percentage View

Toggling percentage view ON and OFF changes the numerical values shown on the handle of each fader from a range of 0->255 to 0% to 100%.

Deselected	Selected

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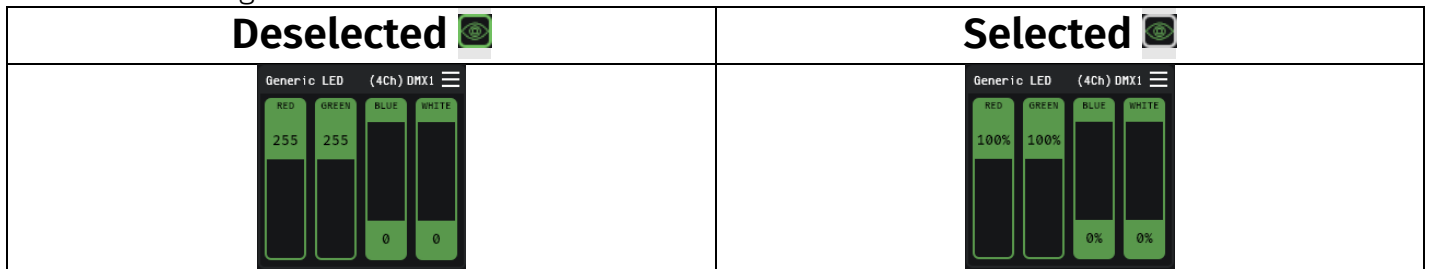
Macros

MACROS

Macros have been added to EMU to make performing programing tasks that do not have a shortcut in the user interface more efficient.

Macros are accessed by clicking on the Macros button at the top left of the screen. And can be applied to fixtures selected in the user interface.

Macro Type	Description
Fan	Fan Macros allow you to create basic fan effects across the selected channels to reduce the need for basic positioning.
Colours	Colour Macros allow you to set RGB colour channels to values defined by name to save time balancing your own colors on each colour attribute fader.
Select	Selection Macros speed up common selection tasks (i.e. automatically selecting your fixtures Pan/Tilt channels).
Utility	Functions to set certain attribute fader levels.

Clear

CLEAR

The clear button is a useful programing tool used to either return all fixtures or just those selected back to their default 'home' values within a Program.

- To return all fixtures in the Program back to their default state press clear with no individual fixture selected.
- To clear specific fixtures individually or as group of fixtures then press the **clear** button.

Clearing a fixture removes all sound trackers, Oscillators and returns faders to their default values.

Widgets

Widgets are controls that are found on the bottom and right-hand side of EMU's interface that either control master settings or allow you to create and configure lighting states for each Program.

To minimize a widget select its title bar.

XY Plot Widget

The XY Plot Widget simplifies control of fixtures with Pan / Tilt functionality, (for example, moving heads or scanners).

Simply select individual fixtures or multiple fixtures with Pan and Tilt capability then drag the blue dot within the XY plot to quickly define position values.

EMU will automatically select the relevant faders.
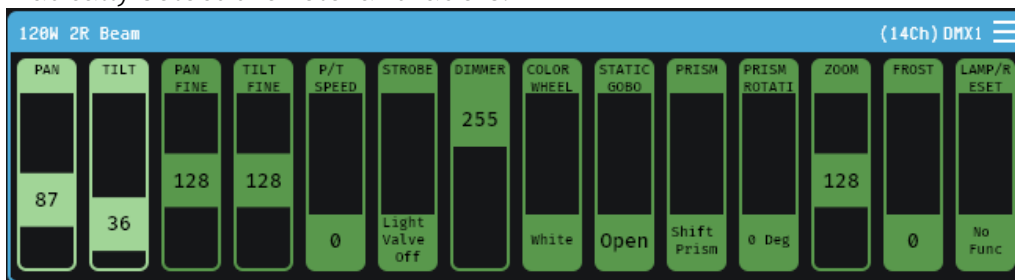
To make setting the position of your fixtures easier it's recommended that the intensity is set to full to make it clear where they are pointing.

Multiple fixtures can be adjusted at the same time by selecting multiple fixtures.

*Note: See the **Channel Widget** section of this guide, to make controlling fixtures in different orrientations simpler and to control certain faders to be inverted to incorperate fixtures fitted in different orrientations.*

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Oscillator & Oscillations Widgets

Oscillator

The Oscillator widget lets you sweep faders up and down to form dynamic lighting states within EMU. Despite consisting of just 6 simple controls, the Oscillator widget is a powerful tool capable of creating multiple time synced effects quickly.
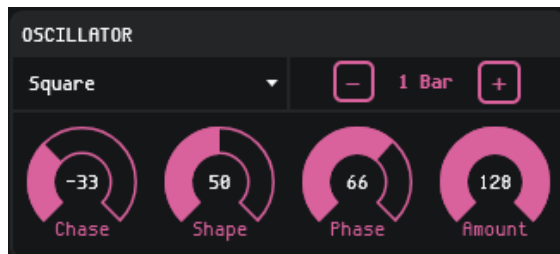
Select the faders you want to apply an Oscillator to then choose an oscillation type from the dropdown.

Oscillator Types				
Sine	Square	Triangle	Ramp Up	Ramp Down

This will turn the selected faders pink to indicate they are under the control of an Oscillator.

Next use the Oscillator controls to create an Oscillator best suited to your performance.

Oscillator Control	Function
Bar +/-	Defines the time taken (in musical bars) for a full cycle of the Oscillator.
Chase	When multiple channels are selected, this spreads the Oscillators to create a more visually interesting chase across your lights
Shape	Morphs the basic waveform into more interesting shapes.
Phase	This adjusts the phase of the Oscillator to define the start point when a Program is triggered and to offset it from other active Oscillators.
Amount	The size of the Oscillator. This is proportional to the fader position of the selected fader.

For more customizable wave formations EMU allows you to map each attribute fader 1:1 directly to a MIDI CC or VST3 parameter to give completely customizable control. Steps on how to do this are detailed further on in this manual.

Oscillations

A list of all oscillations included within the active Program are displayed within the **Oscillations** widget.

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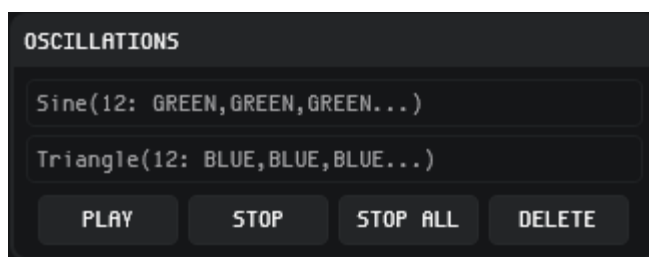
By selecting an Oscillation from the list, all relevant faders are automatically selected allowing fast modification and fine tuning.

Through use of the Oscillations Control buttons at the bottom of the list the following actions can be achieved.

Oscillations Control	Function
Play	Resumes an Oscillator that has been stopped.
Stop	Stops the selected Oscillator.
Stop All	Stops all Oscillations within the Program (does not require selection of Oscillators).
Delete	Removes the Oscillator from the list and all faders it was applied to within the Program.

Masters Widget

Speed

The *Speed* master sets EMU's global tempo (BPM). Use this in conjunction with the Oscillator **Bars +/-** control to create Programs with Oscillators that move in sync with your music.
Note: *When the EMU plug-in Is active or the MIDI Clock option Is active these override Speed master.*
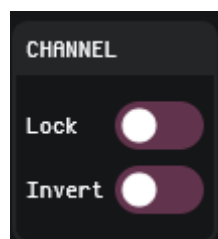
Level

The Level control allows you to dim all fixtures intelligently to reduce the overall light output of your show or create a blackout.

Note: *This control will not affect attributes such as pan, tilt or zoom.*

Channel Widget

The channel widget applies global settings to individual channel faders within your EMU showfile with the aim of simplifying programing. Select individual or a selection of faders to apply the setting using the toggle controls.

Lock

This control freezes the DMX output state for the selected faders for all Programs when enabled. This control Is perfect for setting fixed levels for an entire show that are not required to be modified (I.e a front wash).

Invert

This control inverts the logical direction of the selected channels. This Is useful when a fixture Is mounted In a different physical orientation to the rest of the fixtures In your rig. By Inverting the pan channel of a fixture mounted upside down you can make programing far easier for yourself. This Is a global setting and Is still applied when Interacting with Sound Trackers, Oscillators and all other functionality

Programs & Banks Widget

The Programs & Banks Widget enables you to step through your Banks and Programs quickly and easily as well as defining a **Fade in** transition time for each Program.
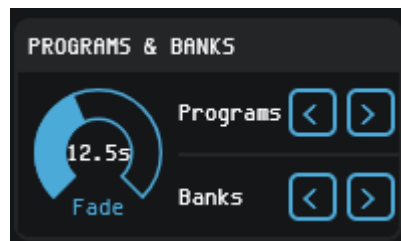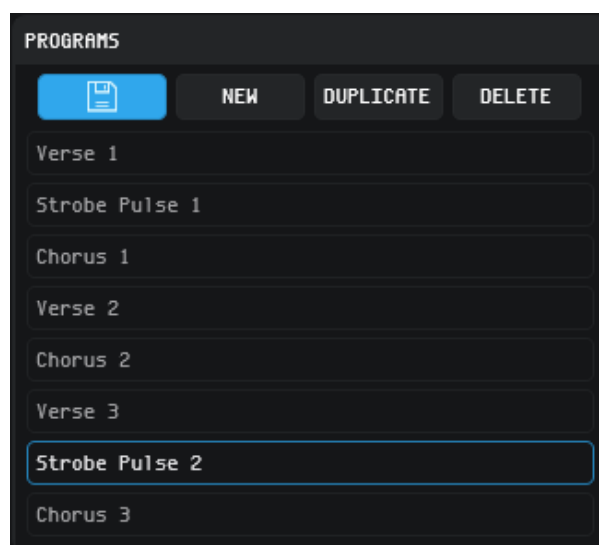

Programs Widget

The Programs Widget is located in the top right of the interface and gives quick access to key functions of the Programs Page without having to navigate to it.

This includes the ability to Save, Create New, Duplicate and Delete Programs within the active Bank

*Note:* *the shortcut for saving a Program is Ctrl+S on Windows and Cmd+S on MacOS.*

Selecting a Program from the list allows navigation between them.

Note: *Renaming of Programs must be carried out within the* *Programs* *window.*

Groups Widget

The Groups widget Incredibly fast to select and deselect multiple fixtures to apply macros or modify the position of using the XY Plot.
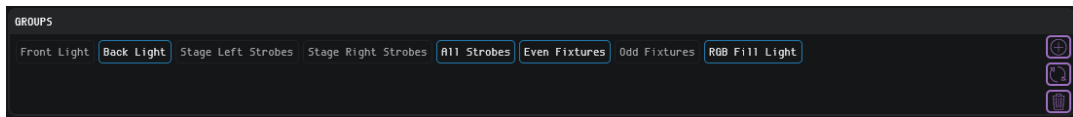
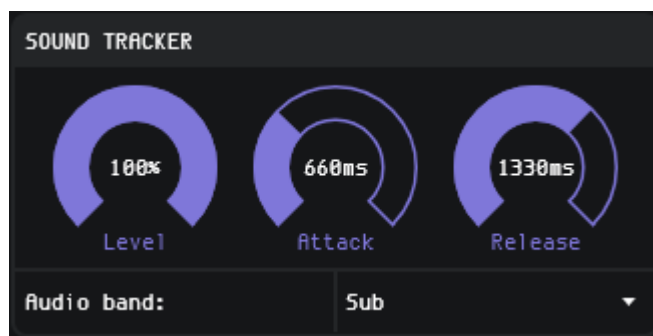-To **add** fixtures to a group, select them within the UI (by holding CMD / Ctrl and clicking). Once all fixtures are selected, press the ⊕ icon.

-To **rename** a group, select it within the Groups widget then press the ↻ icon.

-To **delete** a group, select it within the Groups widget then press the 🗑 icon.

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Sound Tracker Widget

EMU's Sound Tracker can be used to set attribute faders to react to specific EQ bands of live audio input received by EMU.

When the sound tracker threshold is met, the attribute faders snap between 0 and the upper limit defined by the level dial. The Attack and Release time dials can be used to define how smooth this is.

To apply the sound tracker to attributes, select the fader(s) you plan to apply it to and increase the level dial this will set the faders to sound tracker mode.
Repeating this process with different attribute faders selected will allow you to apply different sound tracker settings to faders in the same Program.

Rotary Dial	Description
Level	The level dial defines the upper limit a fader can be raised to by the sound tracker.
Attack	The attack dial defines the time used to transition the fixture attribute(s) being controlled from '0' to the value set by the level dial.
Release	The release dial defines the time used to transition the fixture attribute(s) being controlled from the value set by the level dial to 0.

The steps below show the process of setting the white attribute faders of two RGBW wash fixtures to respond to the frequency of the 'Sub' Audio band using the sound tracker.

1) Hold the Ctrl/CMD key and select the faders:
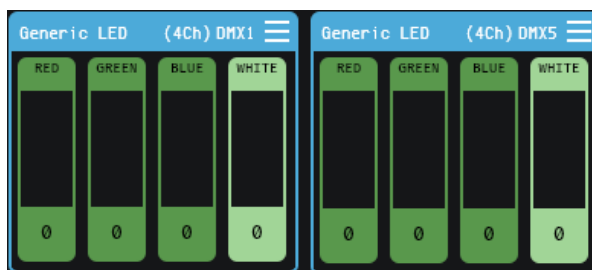
2) Navigate to the Sound Tracker widget and increase the level dial to activate sound tracker for the selected attribute faders.

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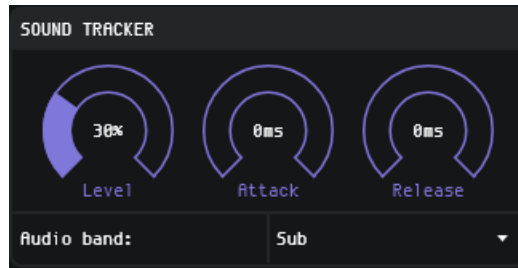
3) The attribute faders will turn pink to indicate they are under the control of the sound tacker.

4) Play audio then select your required Audio Band from the dropdown before adjusting the Attack and Release timing to create a visual effect.
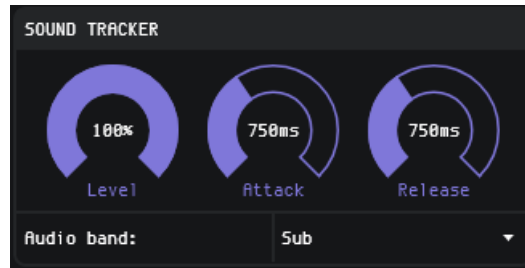
To remove a sound tracker from an attribute fader, select the fader(s) and either set the sound tracker dial **level to 0,** or press backspace.

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Programs & Banks Window

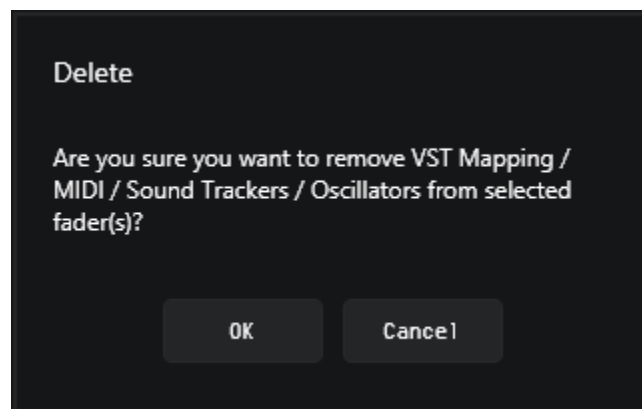Individual lighting states in EMU are called **Programs**, these are stored in **Banks**.

Typically, each Bank is used be used to store all lighting states for an individual song in the form of Programs, allowing each Program to be stepped through.

There are two main ways that Programs and Banks can be edited. The first is through the **Programs Window**, which is accessible by pressing on the programs button at the top of the EMU interface.

The second is through use of the Programs Widget on the right-hand side of the UI. Both share the key functionality for quickly recording and playing back of different Programs and Banks.

Creating a Program using the Programs Window

When creating a Program you need to have the program that you want to edit, set you lights to the state that you want then be in then navigate to the Programs window.
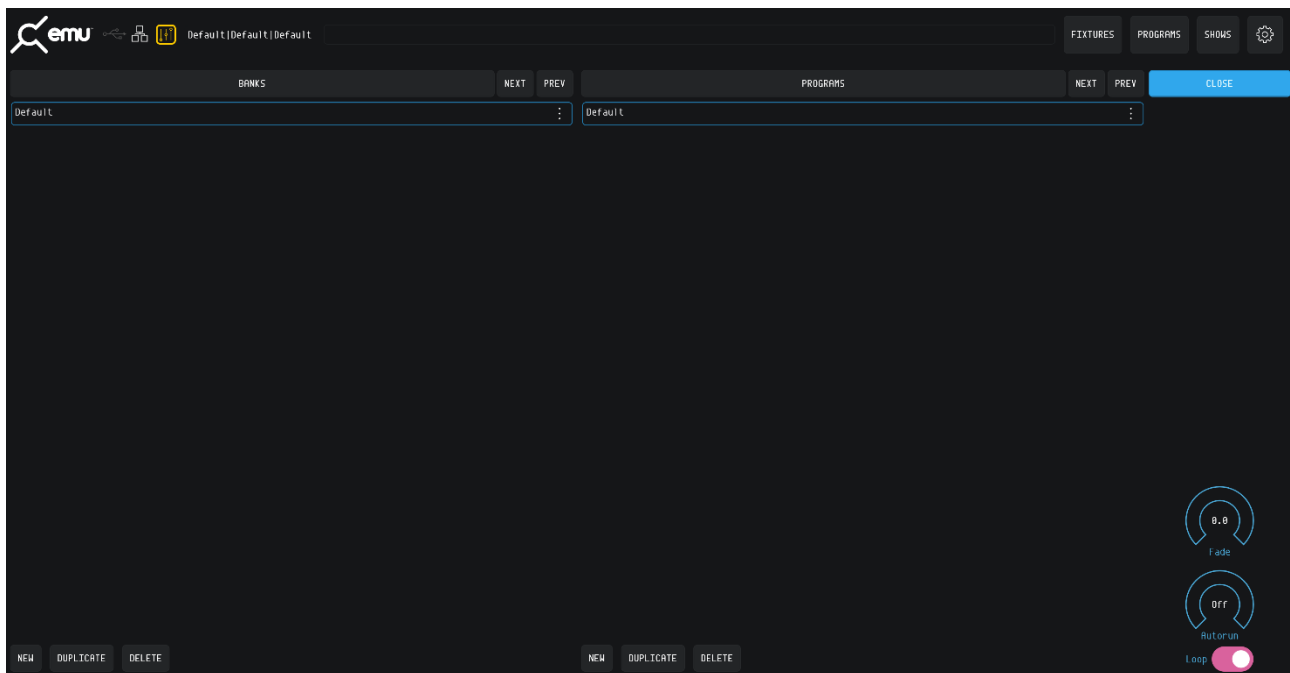
The bottom of the page features "New", "Duplicate" and "Delete" buttons for both Banks and Programs. Using these controls items can be saved, duplicated or deleted.

Renaming a Bank or Program

To rename a Bank or Program simply double click on the name. This will highlight the name text. Type your new name and press enter or click onto another Bank or Program once you're happy with the new name.

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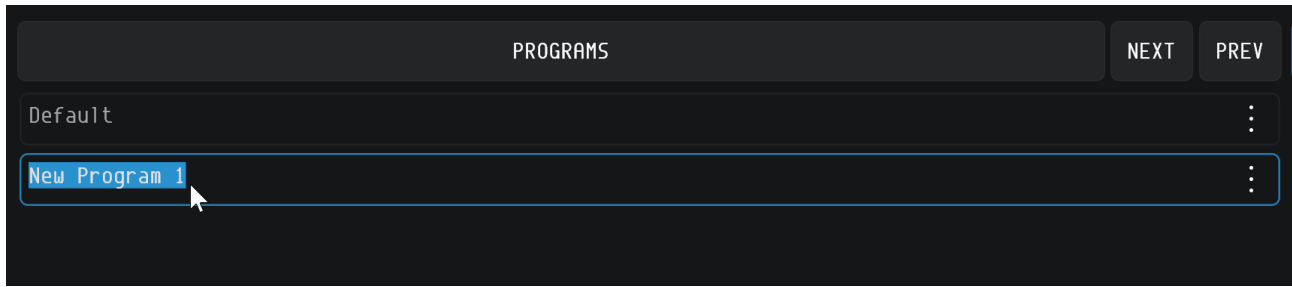
Re-ordering a Bank or Program is easy. simply click on the three dots at the end of the Program and drag it to the position you would like is to be.
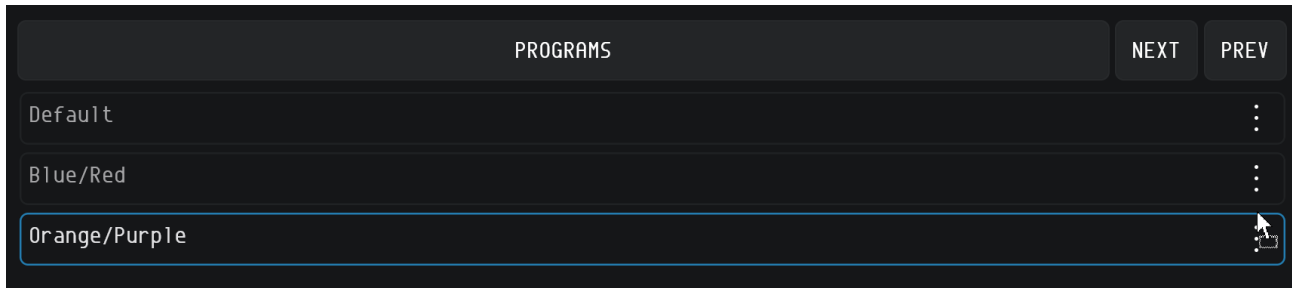
To clone a Program to a new Bank simply drag it from the programs pane over the top of the Bank you want to clone it to.

Autorun

The Autorun function allows you to step through Programs in a Bank autonomously. The autorun time is used to set the spacing between Program transitions. Each transition between Programs references each Program's individual fade time.

By enabling the **Loop** function, the contents of the bank will cycle. If this is disabled it will stop once it reaches the last program in the list.

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VST3 Plug-in & Mapping

EMU's 32-bit Windows and 64-bit MacOS VST plug-in's allow you to run EMU in the background whilst transmitting commands from your DAW to create a perfectly synchronized lightshow all from your sequencer.

When the plug-in Is active the 'Speed' setting In EMU will automatically track the tempo of your DAW to ensure the speed of your Oscillators within EMU match.

This Is a powerful feature for any musicians performing live who may want to modify tempo mid set.

The plug-in allows key attributes including **global speed**, **Program Change** and **Bank Change** to be controlled

The easiest way to create a fully automated light show with EMU's plug-in is as follows:
- Create a number of Banks & Programs for all the looks you want in the show in the EMU UI.

- Adjust the fade attribute in the Programs and Banks Widget for Programs where fades are required.

- Send bank and program change commands to step forward and backward between Programs and Banks.

Program	Program Change
Bank	Bank Change
Bypass	(default)
Fader 1 -> Fader 512	Direct User defined Control
PPQ	Internal use only, non-user modifiable.
Tempo	Internal use only, non-user modifiable. (When tempo is 0 master speed is released back to EMU).
Bar	Internal use only, non-user modifiable.

Note: *In some DAW's you will be required to modify the fader values within EMU before they show up are displayed.*

The plug-in also gives you precise control over your light show if you need it. Every single fader in EMU can be mapped and automated using standard VST automation allowing for precise curves to be drawn to control specific attribute faders perfectly in time with your track without being limited by the shapes that EMU Oscillators can produce.

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Mapping Faders to the VST Plug-in

To map a fixture to a VST use the dropdown on each fixtures menu icon.

Select the 'Map to VST' option on the dropdown to set the entire fixture.

Once a fader is mapped to a VST parameter it is global and will have internal priority over all Programs.
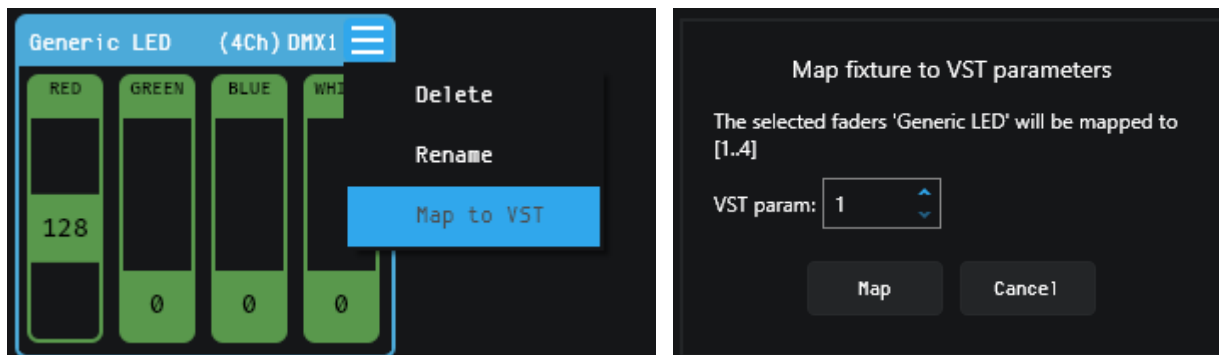
To map multiple faders to the same VST channel select them individually then right click and select the 'VST Mapping' option. This will present an option to select a VST parameter.

Once a fader is mapped it will turn blue, move the fader within EMU for it to be displayed in your DAW.
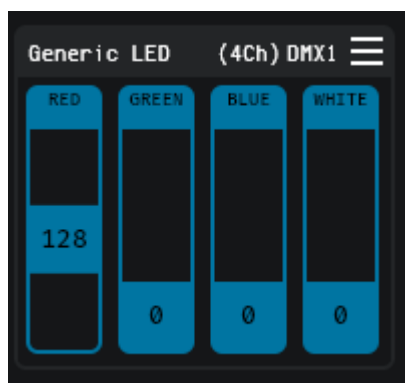
UnMapping Faders from the VST Plug-in

To un-map faders from the VST plug-in simply select faders and dials as when you mapped them and press the [Backspace] key on your keyboard. You will get a dialog asking you to confirm, select OK and your mapping will be cleared.

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MIDI Mapping

EMU allows for MIDI to be mapped to faders and controllers using MIDI learn functionality. This functionality is perfect for mapping hardware to faders to be used at any point within your performance.

To connect and configure your MIDI hardware, refer to the **MIDI Connectivity** section of this guide.

Enabling / Disabling MIDI Mapping Mode

Once your MIDI controller is connected and set up. Click on the yellow box with faders inside above the 'Macro' and 'clear' buttons. This button toggles EMU between Midi learn mode and default operation.
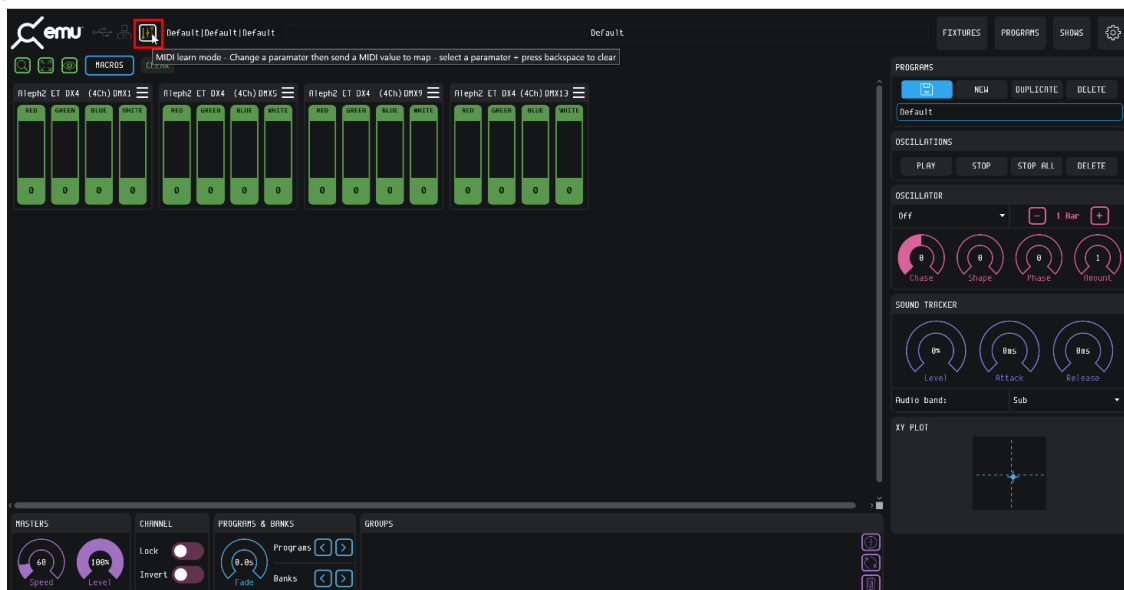
Once in MIDI learn mode, the faders will have their text change to show the MIDI Note that is assigned to them. All MIDI mappable buttons will appear yellow and rotary dials will show yellow text denoting their assigned MIDI channel.
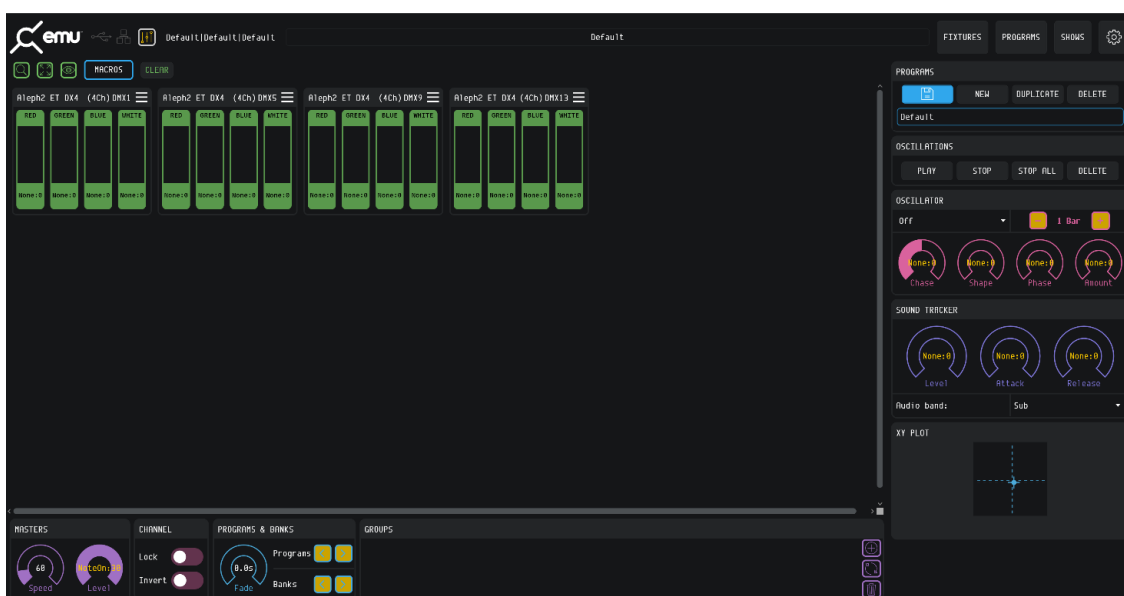
Once you have mapped all that you require, toggle back out of MIDI learn mode using the same button to save this configuration. All MIDI note labels will disappear however MIDI mapped faders will remain yellow.

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MIDI Bank & Program Change

By default, EMU includes permanent MIDI Bank and Program Change methods that are always active.

Fixed MIDI Command	Action within EMU
MIDI CC 0	Advance to the next Bank
MIDI Program Change	Advance to the next Program

In addition to these commands, EMU allows users to map different MIDI commands, to the Program/Bank forward commands for greater flexibility.

Mapping MIDI to Faders

To map MIDI to faders, simply select the fader or faders that you want linked with the MIDI note then send your MIDI signal. The faders should respond immediately by turning yellow, displaying the mapped channel. Multiple faders can be mapped to the same MIDI note at the same time.
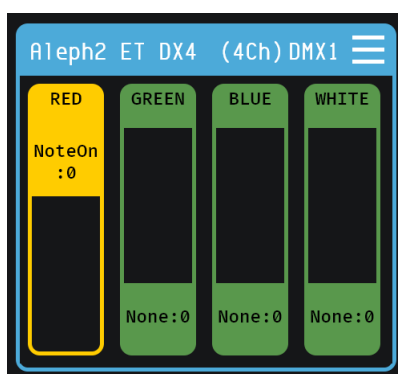

Faders mapped to MIDI take priority over the fader values defined by the active program.

Note: MIDI CC and MIDI Note messages have a 7-Bit resolution (giving a range of 0-127). EMU doubles up this value to extend it to fit the full 0-255 range of a DMX output, this is worth factoring in if the attributes you are controlling require a precise control range. I.e. Pan and Tilt on a moving head.

Mapping MIDI to Buttons and Rotary Dials

To map MIDI to buttons and rotary dials **click and hold** on the function you want to map then send the MIDI signal. As with faders the Dials text will change to reflect the mapped MIDI note. Buttons will look the same.
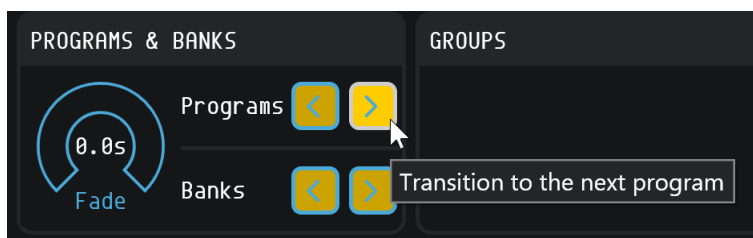

Note: *If mapping MIDI from a DAW on the same computer you will need to create an automation to vary the midi velocity or pulse a note whilst clicking and holding the control within EMU you wish to map.*

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UnMapping MIDI from Faders, Buttons and Rotary Dials

To un-map Midi simply select faders or click and hold on buttons and dials as when you mapped them and press the [Backspace] key on your keyboard. You will get a dialog asking you to confirm, select OK and your mapping will be cleared. This can be done from either Midi learn mode or regular operation.

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Shows Window

To manage your show files, navigate to the 'SHOWS' button at the top right of the interface.
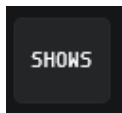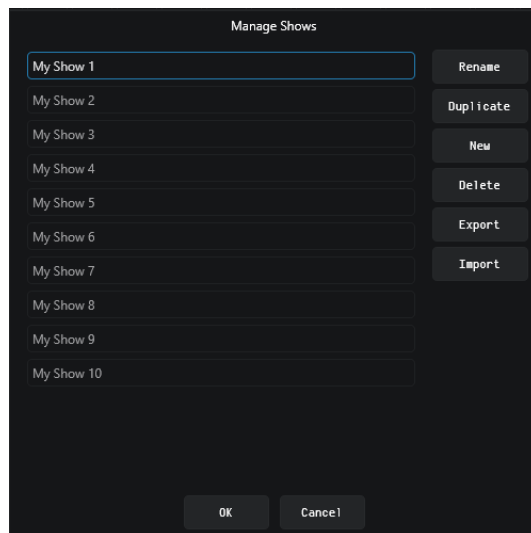
Saving

From the point of opening EMU, all changes made are saved automatically, with the exception of Programs which require manual saving using the save icon in the programs widget or the Ctrl+S(Win) / CMD+S(MacOS) keyboard shortcut to overwrite the previous values stored.

Opening a Showfile

To open an existing showfile, simply select it within the list of EMU Shows on your computer for it lo load.

Managing a Showfile

Rename	Select the show file you want to rename then select this option, a dialogue will show prompting entry of the new name.
Duplicate	Select the show file you want to duplicate then select this option, a dialogue will show prompting for the duplicate show to be named.
New	Pressing New will create a new show, a dialogue will show prompting for the new show to be renamed. Once a name is entered select your new show in the Manage Shows window to open it.
Delete	Select the show file you want to delete then select this option, a dialogue will show prompting for delete confirmation. **Warning, once a show is deleted, this cannot be undone.**
Export	Select the show you want to export then select this option, this will bundle all settings and configuration into one file ending with a .emu file extension allowing the showfile to be easily transferred to another computer or backed up. Showfiles should be exported regularly and before updates, to ensure nothing can be lost if your computer becomes damaged.
Import	Select this option to import a show file that has been exported from another EMU incidence. Once pressed, navigate to the file you want to import making sure it ends in a .emu file extension and press 'OK'

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Definitions

Art-Net: Protocol to transmit DMX over a standard Ethernet network. Designed by and Copyright Artistic Licence Holdings Ltd.

ArtPoll: An element of Art-Net that allows discovery of Art-Net compatible devices on your computer network. (such as ENTTEC's ODE Mk2).

DMX: The most common protocol to control lighting fixtures. The full name is DMX512, which stands for Digital Multiplex.

DMX Universe: Represents 512 DMX channels. Each lighting fixture.

DMX USB Pro: ENTTEC's

FPS: Frames per Second. It refers to an output rate for video or DMX.

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Product Codes & Ordering Information

EMU

Product	SKU
EMU	70680

DMX Control System Components

Product	SKU
DMX USB Pro	71520
Open DMX Ethernet Mk2 (ODE Mk2)	70060
Ethergate Mk3	70066
D-SPLIT 3 AND 5 PIN	70572
D-Split 5-Pin	70575
5 PIN MALE TO 3 PIN FEMALE CONNECTOR	70029
3 PIN MALE TO 5 PIN FEMALE CONNECTOR	70030
3 PIN DMX Terminator	79123
5 PIN DMX Terminator	79122

Visit enttec.com or your ENTTEC reseller to purchase DMX output devices.

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