

LightStrike



User Guide

Version 2.1

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1. Basics

LightStrike provides performer and scenic tracking for OSC/UDP enabled consoles and sACN controlled rigs.

Developed for a critically acclaimed major new West End production, LightStrike tracks flying performers and scenic elements in up to 3 dimensions. Unlike some other tracking solutions, LightStrike doesn't require 3D models, but uses a calibration process to map inputs to outputs.

1.1 System Checklist

Although LightStrike supports several different network and configurations options, the following checklist will give you the best user experience and most flexible solution.

- ✓ Lighting/video console supporting sACN output (Eos-family, GrandMA2 etc.)
- ✓ DMX nodes supporting sACN per-address (DD) priority (ETC Net3 Gateways, Pathway Pathport DMX Gateways etc.)

Note: When using Pathway Pathport DMX Gateways, you should be on at least firmware version 3.7.3. When using Pathport Octos ensure no more than 5 universes share control with LightStrike and the lighting console.

1.2 Input Systems

An Input System supplies LightStrike with data which can be converted to moving light or media server positions. Input Systems provide full or partial positional information from automation or flying systems.

Each Input System has at least one unique port which must match that of the sending system. Some input systems can be assigned to a specific network adapter to support more complex network setups.

1.2.1 Supported Input Systems

EN-NET14 (Studio One Four)

EN-NET14 and associated wire-pull encoders can be connected to automated and non-automated systems to provide positional information for a single axis. Multiple encoders allow tracking in up to 3 dimensions.

Flying by Foy

Positional information can be tracked by LightStrike to provide full 2D/3D performer flying tracking.

Kinesys

Tracking of scenery positions in up to 3 dimensions. Support for K2 V1.2.xxx and V1.3.xxx, and Vector V2.1.0.54 and later.

OSC (Open Sound Control)

OSC can be used to quit LightStrike or shutdown the machine it is running on.

PRG

Tracking of positional data to support up to 3 dimensions. To provide maximum flexibility, you must specify how many properties (types of information about each object) are provided in the data packet, and the index of positional information (after the identifier).

Example: Object1, {Position}, {Velocity}, Object2, {Position}, {Velocity}

There are 2 properties per index and the position is at index 1.

PosiStageNet 1/2

Tracking of automation data in up to 3 dimensions. Support for multiple frames allows large numbers of objects to be tracked from a single controller.

sACN

sACN input can be used to enable/disable conversions, provide live offsets to other input systems, or as its own axis.

Silicon Theatre Scenery (STS)

Tracking of scenery positions, including revolve data.

Simotion (Stage Technologies)

Tracking of scenery positions in up to 3 dimensions. Multiple 'Nodes' are supported.

Spikemark

Tracking of motor positions using the 'Watchout' data format.

1.3 User Input Systems

Some types of input systems require additional calculations before the data provided can be turned into useful axis values. An example of this would be converting the position of a revolve in degrees into an X/Y coordinate.

1.3.1 Supported User Inputs

Revolve

Converts an Input System revolve position in degrees to either an X/Y coordinate, or a looping 0-359° value.

Supports: EN-NET14, Flying by Foy, Kinesys, PRG, PosiStageNet 1, PosiStageNet2, sACN, Silicon Theatre Scenery, Simotion (Stage Technologies), Spikemark (Watchout)

Trilateration (Foy)

Trilateration uses the lengths of wires and known winch/motor positions to calculate a 3D position.

Supports: Flying by Foy

1.4 Coordinates

In many cases a single Input System may be used to provide all positional data, but to support advanced configurations, LightStrike allows you to build coordinates from any supported Input System or User Input System. This means the X/Z position could, for example, come from Flying by Foy whilst the Y is provided by PosiStageNet.

LightStrike uses the following coordinate system:

X – Horizontal (left/right)

Y – Horizontal (near/far)

Z - Vertical (up/down)

Some Input Systems use different coordinate systems. More information can be found under Input Settings.

1.4.1 Zones

Each Coordinate can have one or more Zones. Each Zone represents a region in 1D, 2D or 3D space. Zones can have a label, colour and actions applied to them. Zones can be used for information purposes, or queried by Logic (see below).

Licensed copies of LightStrike will display the current Zone within the Coordinate Monitoring display.

Zones cannot overlap, but can be nested up to 2 deep.

1.5 Logic

Logic Actions are used to provide additional functionality based on the result of logic calculations. You may wish to use Logic to inhibit a particular fixture's intensity when an object is outside a particular zone, or when a performer flies higher than another for example.

Once created, Logic Actions can be applied to any Conversion of the applicable type.

Intensity

Intensity Logic Actions can be applied to Array/Map Intensity Conversions. They either inhibit or uninhibit the output level depending on the result of the calculation.

1.6 Output Systems

OSC (Open Sound Control)

OSC commands can be sent to any device which supports the protocol, including Eos-family consoles running version 2.3 or later. Sneak Entry/Exit using OSC is currently only available with Eos-family consoles.

UDP

UDP ASCII strings can be sent to any device which supports them, including Eos-family consoles.

sACN

sACN can be used to provide direct control of fixtures or media servers which support it. LightStrike supports per-address (DD) priority which allows only enabled addresses to be controlled by LightStrike whilst leaving another system in control of the rest of a universe. Only certain DMX nodes such as ETC Net3 Gateways or Pathway DMX Gateways support per-address priority. An sACN merge option is also available where this is not supported, although this may introduce some slight lag in larger systems.

1.7 Calculations and Dimensions

1.7.1 Calculations

LightStrike uses a process of calibration to calculate the output for a certain input. Your usage model will define how many points of calibration are required for each Conversion (parameter).

There are two methods for calculating output, each of which is targeted for certain types of usage.

Linear

Linear calculations are used for media servers/projection, or arrays of lighting fixtures such as bars or grids of pixels. For these purposes, there is no need to enter an intermediate value between the minimum and maximum output as it follows a linear course.

Non-linear

Non-linear calculations are mainly used for moving light fixtures. In these cases, the output is not linear from point to point but follows a curve. To calculate the required output, LightStrike requires an intermediate (middle) point.

Some Conversions only require the tracking of one axis, whilst others may track multiple axis. See Dimensions below.

1.7.2 Dimensions

LightStrike has 7 possible options for dimensions, which allows tracking of all combinations of axis.

1D X

The output is calculated by tracking the Coordinate's X axis, and comparing it with the corresponding minimum, intermediate (for non-linear) and maximum X output values. 2/3 calibration points required.

1D Y

The output is calculated by tracking the Coordinate's Y axis, and comparing it with the corresponding minimum, intermediate (for non-linear) and maximum Y output values. 2/3 calibration points required.

1D Z

The output is calculated by tracking the Coordinate's Z axis, and comparing it with the corresponding minimum, intermediate (for non-linear) and maximum Z output values. 2/3 calibration points required.

2D XY

The output is calculated by tracking the Coordinate's X and Y axis, and comparing them with the corresponding minimum, intermediate (for non-linear) and maximum output X and Y values. 6/9 calibration points required.

2D XZ

The output is calculated by tracking the Coordinate's X and Z axis, and comparing them with the corresponding minimum, intermediate (for non-linear) and maximum output X and Z values. 6/9 calibration points required.

2D YZ

The output is calculated by tracking the Coordinate's Y and Z axis, and comparing them with the corresponding minimum, intermediate (for non-linear) and maximum output Y and Z values. 6/9 calibration points required.

2D or not 2D?

That is the question. When should you use a 2D calculation vs a 1D calculation.

Example: a light is required to follow a performer on a track that can move vertically and horizontally (left/right). The light is rigged in front of the track and nearer to one end. As the light is hanging in a conventional manner (vertically), Tilt controls the vertical movement of the beam whilst Pan controls the horizontal movement.

1D. To calculate the Pan value, LightStrike only needs to know the horizontal (X) position as even if the performer moves up and down this will not affect the Pan output. Therefore, only a 1D calculation is required.

2D. To calculate the Tilt value, LightStrike needs to know both the horizontal (X) and the vertical (Z) positions. This is because as the performer moves away (horizontally) from the light, the Tilt value reduces i.e. the angles become shallower. Therefore, a 2D calculation is required.

If a fixture was rigged sideways, where Tilt controlled the horizontal movement of the beam, the use of 1D and 2D would be inverted.

3D XYZ

The output is calculated by tracking the Coordinate's X, Y and Z axis, and comparing them with the corresponding minimum, intermediate and maximum output X, Y and Z values. This option always uses non-linear calculations. 27 calibration points required.

2. Settings

Settings is designed to ease your workflow. When completing your initial setup of LightStrike begin with Inputs and work across each tab from left to right.

LightStrike show files use the .lsf extension. LightStrike continuously saves working changes to a persistent store, so quitting and relaunching will not lose changes. However, it is recommended to save regularly in case you need to go back to a previous version. LightStrike always saves files with a date/time stamp, so you are always saving a new version rather than overwriting a previous file.

Note: Settings are not automatically synchronised with a backup device but can be transferred at any time by going to File > Send to Backup or keyboard shortcut ⌘+B. It is also possible to start a transfer whenever you save on the Primary. See Application Settings.

2.1 System

System settings are all stored on the device and are not included in the Settings.lsf show file.

2.1.1 Device

Name

Choose a name to uniquely identify this device. This will be used as the source name for sACN data.

Mode

Choose the operating mode for this device

Primary – the device operates with a backup and will normally output data

Backup – the device observes a primary and will only output data if the primary fails

Standalone – the device operates without a backup and will normally output data

Backup IP

Enter the IP address of the backup device when in Primary mode.

Backup Interface

Communications between Primary and Backup can be bound to a specific network interface on the host machine. Alternatively, setting this to 'Default' will always use the default adapter in macOS System Preferences.


Network Interfaces

Up to 5 named network interfaces are supported, and each of these is assigned to a specific network adapter or the default adapter. These interfaces are available to some Input/Outputs systems. The same physical adapter can be assigned to multiple interfaces.

When running with a primary and backup, the interfaces must be setup on both machines, ensuring the numbering remains consistent.

2.1.2 Application

Kiosk Mode

When in Show Mode, Kiosk Mode auto hides the macOS Menu Bar and Dock, and prevents the machine from being shut down or restarted via the  menu.

Save on Exit

When Save on Exit is enabled, quitting LightStrike saves the show file to the last directory specified.

Send to Backup on Save

Whenever a save action is initiated by the user, the Primary will attempt to transfer the show file to the backup. This does not occur on exit when 'Save on Exit' is enabled.

Delay Networking

Some faster Mac hardware will start LightStrike before the network interfaces are fully initialised. To ensure networking starts correctly Delay Networking delays the start of network activity in LightStrike for 5 seconds to ensure devices are online.

Reopen Displays on Load

When Reopen Displays on Load is enabled, all monitoring displays (Input, Coordinate, Output) will be reopened in their previous location after a show load/new or when launching LightStrike. This setting is ideal for show operation setups.

Note: On larger shows leaving Input/Output monitoring open during operation is not recommended as this places additional load on the CPU which is best dedicated to processing fades.

Nudge Coarse

Many numeric text fields support nudging the current value using the arrow keys. Enter a value between 0.0-100.0 to be used when the Up/Down arrow keys are used.

Nudge Fine

Many numeric text fields support nudging the current value using the arrow keys. Enter a value between 0.0-100.0 to be used when the Shift+Up/Down arrow keys are used.

Licensing

Select 'Edit' to enter licence information, or deactivate an existing licence on this machine.

It is important that you enter the Name and Licence Key exactly as you received them. LightStrike will display the version purchased (Basic, Plus, Pro) when it is activated.

2.2 Inputs

All configuration of input systems is done here. Some input systems have additional settings which appear in the table on the right. If an input system supports variables they can be added or removed using the +/- buttons in the table at the bottom.

2.2.1 General

Enabled

When an input system is enabled the specified port is opened, and ready to receive data.

Port

The port(s) should be set to match the send port(s) on the external input system. Ports must be unique across input/output systems and each system has a suggested port prefilled. You can enter multiple ports separated by a comma.

Interface

Some input systems (mainly those using Multicast) can be bound to a specific network interface on the host machine. Alternatively, setting this to 'Default' will always use the default adapter in macOS System Preferences.

Variables

Variables are used for several purposes, including modifying user input systems and as user configurable offsets for other input systems.

All variables have a label to distinguish them and minimum/maximum outputs which are used to convert the raw data such as sACN into a useful value.

Offsets

An offset is used to adjust an input axis in either direction. An example may be to centre on a head rather than torso. As input systems use different systems of measurement you will need to define variables with different ranges for different input systems.

Example:

If your input system provides values in millimetres, you may wish to set Min Output to -1000 and Max Output to 1000. This will allow you to modify the value being received by 1 metre in either direction.

Modifying User Input Systems

To track an object or person, some user input system types such as Revolve require extra information in addition to that provided by an automation input system. Where this is possible you will be able to select from the list of variables. You will need to specify a sensible Min Output/Max Output for these cases such as 0-100 for '% from centre'.

2.3 User Inputs

Creating and configuring user input systems is done here. Additional settings will appear in the table on the right. User input systems can be added or removed using the +/- buttons.

2.3.1 Revolve

World (not always shown)

The identifier of the input world (sometimes called node). Not all input systems support worlds. This can be either a number or textual identifier such as '0' or 'one'.

ID

The identifier of the input. This can be either a number or textual identifier such as '51' or 'Revolve'.

Variable (not always shown)

The identifier of the axis variable. Not all input systems support multiple axis for a single identifier. Select from X, Y or Z.

Clockwise

This should be checked if the input system increments degrees when rotating clockwise.

Offset Rotation / North

To provide useful coordinates 0° should be at 12 o'clock (north). Enter a value between 0-359 to correct this if necessary.

The 'North' value shows what the input system would be sending when at 12 o'clock (north) before the offset is applied.

Min Input (0°)

Enter the value received from the Input System when the revolve is at its 0° position. This will usually be 0.

Max Input (360°)

Enter the value received from the Input System when the revolve is at its 360° position. This may be 360 or another value such as 36,000 depending on the Input System and configuration. If the input continues incrementing beyond the first 360° this should be the value after the first revolution.

Diameter

Enter the diameter of the revolve. This value is used to create an X/Y coordinate and is only used within LightStrike.

Example: Diameter 20,000 will produce coordinates from -10,000 X / -10,000 Y to 10,000 X / 10,000 Y. The centre of the revolve is always zero.

% from centre

To calculate the X/Y position of an object within the area of the revolve LightStrike needs to know where it is in relation to centre. 0% mean the object is at the centre of the revolve, 100% means it is at the very edge. Create an Input System Variable with a range of 0-100 and map it here.

Object Offset

The standard calculations assume the object is positioned on the revolve at 0°. In reality of course that is mostly not the case. To allow LightStrike to know where the object is, create an Input System Variable with a range of 0-359 and map it here.

2.3.2 Trilateration

To perform trilateration, LightStrike requires the positions of 3 winches/motors and the identifiers of each of those motors to read the wire lengths.

Point ID (x3)

The identifier for this winch/motor

Point X (x3)

The X coordinate of this winch/motor

Point Y (x3)

The Y coordinate of this winch/motor

Point Z (x3)

The Z coordinate of this winch/motor

2.4 Coordinates

Creating and configuring coordinates is done here. Add or remove coordinates using the +/- buttons.

A coordinate can have up to 3 axis (X/Y/Z) and each can track any combination of inputs.

Label

Choose a label for this coordinate to easily identify it such as 'DS Slider'.

System (X, Y, Z)

Select the input system to be used for the X, Y or Z axis of this coordinate. Choose 'User' to track a User Input System.

World (X, Y, Z)

The identifier of the input world (sometimes called node). Not all input systems support worlds. This can be either a number or textual identifier such as '0' or 'one'.

ID (X, Y, Z)

The identifier of the input. This can be either a number or textual identifier such as '51' or 'Slider'.

Variable (X, Y, Z)

The identifier of the axis variable. Not all input systems support multiple axis for a single identifier. Select from X, Y or Z.

2.4.1 Zones

When a Coordinate is selected, it is possible to add or remove Zones using the +/- buttons. Creating a Zone with an existing Zone selected will create a nested Zone.

Note: Zones can be nested up to 2 deep, but cannot overlap or be larger than their parent. When a Zone's limits are displayed in red, the Zone is invalid and will not be used for calculations. Edit the Zone or its parent until the text displays in white.

Zone

You can enter a label such as 'Centre Stage' and select a colour to display by clicking the small grey box.

Min/Max

Enter minimum and maximum values for each of the applicable axis. Minimum values must be less than maximum values.

Actions

Add or remove Zone Actions. See below.

2.4.2 Zone Actions

Zone Actions are triggered whenever Coordinate enters or exits a Zone. You can add one or more Zone Actions to any Zone.

Zone Actions send a user defined OSC command whenever the change occurs. A 'Test' button allows the command output to be tested.

Desk Control

It is possible to enable desk control for a Zone Action, this allows the resulting OSC command to be turned on and off from the lighting console.

Set the address, size (16 bit) and a range to enable the Zone Action.

Send

As OSC packets are sent via UDP, it is possible that a packet may be dropped. To help ensure the command reaches its destination, you can choose to send it between 1 and 5 times.

2.5 Logic

Creating and configuring Logic Actions is done here. You can add or remove Logic Actions using the +/- buttons.

A Logic Action must be valid before its result will be applied. Ensure the traffic light indicator is either red, or green.

Traffic Lights

None	Invalid
Red	Inactive (the opposite of the specified Result will be applied)
Green	Active (the specified Result will be applied)

Label

A useful reference for this Logic Action, for example 'Outside Centre Area'.

Formats

Logic Actions can be creating using any of the following formats. Select items from the drop-down menus to build each action.

{Coordinate A} [Is Inside] {Zone A}
{Coordinate A} [Is Outside] {Zone A}
{Coordinate A} [Is Less Than] {Coordinate B} {Axis (X/Y/Z)}
{Coordinate A} [Is Greater Than] {Coordinate B} {Axis (X/Y/Z)}

Result

Select either Inhibit or Uninhibit to choose the action when the Logic Action is active (green). When the result changes, it is applied using either the Sneak Time, or the Logic Time selected in the Input/Output display.

2.6 Outputs

All configuration of output systems is done here. Some output systems have additional settings which appear in the table on the right.

2.6.1 General

Enabled

When an output system is enabled the system will prepare to output data using the other settings provided.

Port

Where allowed, choose which port should be used by the output system. Ports must be unique across input/output systems and each system has a suggested port prefilled.

Interface

Select which network interface to use for sending data for this output system. Alternatively setting to 'Default' will always use the default adapter in macOS System Preferences.

Rate

Enter the output rate for this output system in milliseconds where allowed.

2.6.2 Additional Settings (sACN)

Priority

Enter the priority from 0-200 to be used for sending sACN packets. The sACN priority is used by receiving devices to decide which source of data to use. A higher number means the data will be used over that of a lower priority.

Per Slot Priority

Enter the priority from 0-200 to be used for sending active sACN per-address (DD) packets. The sACN priority is used by receiving devices to decide which source of data to use. A higher number means the data will be used over that of a lower priority.

Note: When using DMX nodes supporting per-address (DD) priority, it is important that 'Per Slot Priority' is set higher than the lighting/video console. In addition, setting 'Priority' to a lower number than the console may help recover cleanly in the unlikely event of a full system failure.

Merge Output

By default, LightStrike uses per-address (DD) priority sACN to allow other control systems to retain ownership of other fixtures on the same universe. Not all DMX node manufacturers support this so LightStrike includes an option to merge other sources with LightStrike data. ETC gateways support sACN per-address priority.

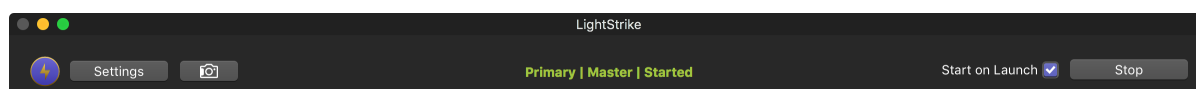
Note: Using Merge Output will have a noticeable effect on performance when using multiple universes, particularly on devices with lower specifications.

3. Main Interface

The main interface is split into four sections.

3.1 Controls

The Controls area provides settings, status and launch options.



Settings

Enter Settings using the button on the left of the window.

sACN Capture

The camera icon opens the sACN Capture window, which is used for capturing sACN values from another controller and storing them in LightStrike.

Status

The status bar shows the device mode, status and whether output is started. The status is split into 3 sections

Device Mode | Device Status | Output Started

Device Mode displays the current mode of this device; Primary, Backup or Standalone (see Device Mode)

Device Status will display Master, Waiting or Tracking. A Primary/Single device will always display Master. A backup device will initially display waiting until it has connected to the Primary at which point it will display Tracking. If the backup takes over it will switch to displaying Master.

Output Started displays whether this device is currently enabled for output or 'Started'. When the 'Start' button is pressed, or 'Start on launch' is checked, the device will attempt to activate output. A backup will also display 'Started', even when in a Tracking state. This ensures output will occur when it takes over.

Note: Restoring to a Primary after the Backup has become Master is not supported. Backups can be brought online and offline as desired however.

Launch Options

The 'Start' button enables output for this device. When 'Start' is pressed LightStrike checks for an active licence and ensures the number of enabled Conversions is

within the limit for the licence type. The same checks occur on a backup to ensure it is permitted to take over control if the Primary device fails.

For show running it is often helpful to have LightStrike automatically enable output when it starts. Checking 'Start on launch' will enable output as soon as LightStrike launches.

Tools

You can click the LightStrike (icon) button to access certain tools. See Tools below.

3.2 Conversions

Conversions are the key component in LightStrike's operation. They define the mapping between input and output. Each Conversion acts on a single parameter or attribute of a fixture for example Pan, Tilt, Zoom or Intensity.

To search for a Conversion, select Find from the Edit menu, or press $\mathbb{H}+F$. Enter text to search by label or notes.

Enable	Type	Label	Coordinate	Coord Override	Active Coord	Desk Control	Control	Enable in Range	Logic	Native	Sneak Entry	Sneak Exit	Sneak Time	Dimensions
■	<input checked="" type="checkbox"/>	A 501 Pan	DS Slider	0/0	DS Slider	<input checked="" type="checkbox"/>	91/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	1D X
■	<input checked="" type="checkbox"/>	A 501 Tilt	DS Slider	0/0	DS Slider	<input checked="" type="checkbox"/>	91/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	1D X
■	<input checked="" type="checkbox"/>	A 502 Pan	Track 1	0/0	Track 1	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	2D XZ
■	<input checked="" type="checkbox"/>	A 502 Tilt	Track 1	0/0	Track 1	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	2D XZ
■	<input checked="" type="checkbox"/>	A 101 Pan	Revolve	0/0	Revolve	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	2D XY
■	<input checked="" type="checkbox"/>	A 101 Tilt	Revolve	0/0	Revolve	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	2D XY
■	<input checked="" type="checkbox"/>	M 102 Pan	Track 1	0/0	Track 1	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	1D X
■	<input checked="" type="checkbox"/>	M 102 Tilt	Track 1	0/0	Track 1	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	1D X
■	<input checked="" type="checkbox"/>	MI 102 Intens	Track 1	0/0	Track 1	<input type="checkbox"/>	1/1	240-255	--	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.0	1D X

You can add, delete, copy or move ranges of Conversions using the buttons below the table.



Types

There are four types of Conversion: Array, Array Intensity, Map and Map Intensity. All types share most properties, but Array Intensity and Map Intensity have additional functionality for dealing with intensity control of fixtures, see below.

3.2.1 Conversion Properties

Traffic Lights

- Red** Disabled (manually or by sACN)
- Amber** Enabled (manually or by sACN) and Output Disabled
- Green** Enabled (manually or by sACN) and Output Enabled

Enable

When checked, this conversion is ready to output data. LightStrike licences operate based on enabled Conversions. LightStrike will inform you if you have more Conversions enabled than the limit on your licence.

Type

Displays the Conversion type.

- A Array
- AI Array Intensity
- M Map
- MI Map Intensity

Label

A useful reference for this Conversion, for example 'Channel 501 Pan'.

Coordinate

Select the Coordinate you wish this Conversion to use.

Coord(inate) Override

You can optionally change the Coordinate a Conversion is currently following using sACN. When an address is entered in this field the 16 Bit value received via sACN indicates the Coordinate number the conversion will follow (1-65535). You can enter values using either Universe/Address or Address format e.g. 2/1 or 513. An sACN value of 0 means the Conversion will follow the Coordinate set in the Coordinate selection box. You can view the Coordinate ID in the Coordinate Monitoring window. To disable Coordinate Override, set the address to 0/0.

Active Coord(inate)

Displays the Coordinate which is currently being tracked by this Conversion. This is set by a combination of the previous two properties (Coordinate/Coord Override).

Desk Control

When checked, the Conversion can be enabled or disabled via sACN using the Control address (see next). If unchecked and the Conversion is enabled, data will always be output for this Conversion when output is active.

When Desk Control is enabled, any offset values entered in the Input/Output window (see below) will be ignored and sACN Input will be used instead.

Control

Enter an address to be used for enabling or disabling this Conversion. This is always an 8-bit property. Any level within the range chosen in 'Enable in Range' will enable the Conversion. You can enter values using either Universe/Address or Address format e.g. 2/1 or 513. Multiple conversions can share the same control address. This address is only used when Desk Control is checked.

Enable in Range

Select a level range used to enable this Conversion. This allows a single address to be used to exclusively enable up to 24 different conversions. These ranges are intended for use where a single light/layer is used to track different objects, and thus has multiple unrelated conversions.

Logic (Array/Map Intensity Conversions only)

Select the Logic Action to be applied to the Conversion. When the action is active, the selected result will be applied. See Logic.

Native

Under normal circumstances it is not possible to fade between two Conversions sharing the same output address. Whilst this is by design, there are circumstances when this may be desirable.

To allow Conversions to fade between each other, all Conversions using the same output address must meet the following conditions:

- Use desk control
- Share a control address
- Unique enable range
- 'Native' checked

Note: This setting can have serious performance issues and is not intended to be used for all Conversions in a show file.

Sneak Entry

Sneak Entry can be used when either OSC or sACN is selected as the output system. Sneak Entry is currently only offered via OSC on Eos-family consoles, where a sneak command is sent to Eos when the Conversion is enabled via desk control. When Sneak Entry is selected with sACN output LightStrike fades from the position currently being received for that address from another sACN source.

Sneak Exit

Sneak Exit can be used when either OSC or sACN is selected as the output system. Sneak Exit is currently only offered via OSC on Eos-family consoles, where a sneak command is sent to Eos when the Conversion is disabled via desk control. When Sneak Exit is selected with sACN output LightStrike fades to the position currently being received for that address from another sACN source.

Sneak Time

Defines the time used by Sneak Entry/Exit (see above). Values are entered in seconds from 0.0-60.0, for example 1.5 seconds.

Dimensions

Define the dimensions to be used for this conversion. The various 1D and 2D options define which of the 3 potential axis are used. See Calculations and Dimensions for more information.

Input/Output

Click to open the Input/Output window which defines the mapping of input and output information associated with this Conversion. See Input/Output for more information.

Output System

Choose the Output System which should be used by this Conversion, for example OSC or sACN.

Address

When sACN is selected as the output system for this Conversion, the address used for output is set here. You can enter values using either Universe/Address or Address format e.g. 2/1 or 513. If you wish to use sACN Capture for this Conversion, you must specify an address here, even if not using sACN for output.

16 Bit

When sACN is selected as the output system for this Conversion, this field defines whether the Conversion is controlling a 16-bit parameter for example pan, tilt. If you wish to use sACN Capture for this Conversion, you must specify the correct size here, even if not using sACN for output.

Smoothing

LightStrike can optionally smooth Input System data in cases where it is irregular or jumpy. Smoothing ranges from 1 (low) to 14 (high), and will vary between systems. Higher smoothing will inherently cause a noticeable lag.

Output

Where OSC or UDP are used as the output system the string sent is defined here. Insert '=%@' at the point where the output value should be inserted. This will be replaced on output. See OSC Output for more information.

Notes

You can enter any notes here which may be useful.

3.2.2 Conversions Types


Array

The 'basic' Conversion type. Provides calibrated points in up to 3 dimensions using an array of values.

They are added using the  button

Array Intensity

Uses the same array of points as Array Conversions.

Array Intensity Conversions have extended functionality to deal with intensity control of fixtures. They are added using the  button.

Unlike Array Conversions, Array Intensity Conversions observe the sACN levels of their Address (see above) coming from another source and master it when enabled. This allows you to set a top level from a lighting console and LightStrike will master it as the object moves nearer and farther from the fixture.

Array Intensity Conversions can also have logic applied to them, which allows the fixtures intensity to be inhibited based on certain criteria e.g. when an object is higher than another object. See Logic.

Map

Map Conversions provide a user definable list of mapping points. Map Conversions support 1 dimension.

They are added using the  button.

Map Intensity

Uses the same list of points as Map Conversions.

Map Intensity Conversions have extended functionality to deal with intensity control of fixtures. They are added using the  button.

Unlike Map Conversions, Map Intensity Conversions observe the sACN levels of their Address (see above) coming from another source and master it when enabled. This allows you to set a top level from a lighting console and LightStrike will master it as the object moves nearer and farther from the fixture.

Map Intensity Conversions can also have logic applied to them, which allows the fixtures intensity to be inhibited based on certain criteria e.g. when an object is higher than another object. See Logic.

3.3 Display Mode

LightStrike has two display modes designed for different types of operation.

Edit Mode

Edit Mode is designed for use during setup and when regular editing is taking place. Data is displayed and edited in a large table, providing a good overview of data and allowing easy comparison between conversions.

Show Mode

Show Mode is primarily intended for use during Show Operation. Conversions cannot be added, removed or reordered in this mode. An editing pane can be displayed on the right of the table to edit conversions in this mode. When many conversions are being used, Show Mode helps the interface be more responsive.

3.4 Logging

The logging window shows information about LightStrike, network status and errors.

```
[15:27:56.544] Listening for Foy UDP on port 34980
[15:27:59.283] Listening for STS UDP on port 3012
[15:28:01.983] Sending OSC on port 3002
[15:28:02.673] Ready to output sACN
```

3.4.1 Input/Output

If for some reason an error occurs binding to a port for example you will see 'FAILED' prior to the normal message. In addition, the Input/Output indicator lights will also show that failure has occurred, see Monitoring.

3.5 Monitoring

The Monitoring bar provides access to Input, Coordinate and Output monitoring windows, along with 'traffic light' status indicators.



Input Traffic Lights

- Red** Error preparing to receive data e.g. the port cannot be opened.
- Amber** Ready but no data is being received.
- Green** Data is being received.

Output Traffic Lights

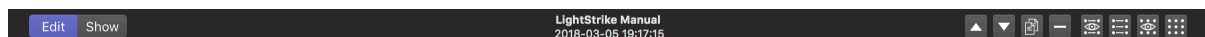
- Red** Error preparing to send data e.g. the port is not available.
- Amber** Ready to send, but output is disabled (e.g. a tracking backup)
- Green** Output is enabled.

If an indicator is **red** the problem likely lies in LightStrike, or you have no network connected. **Amber** means LightStrike is ready to communicate, whilst **green** means everything is active.

3.6 File Information

Centred above the logging window is the current show file information. At the top is the name of the show, and below it the previous save date/time.

Unsaved changes since the last time LightStrike was launched are indicated by a * next to the show name.

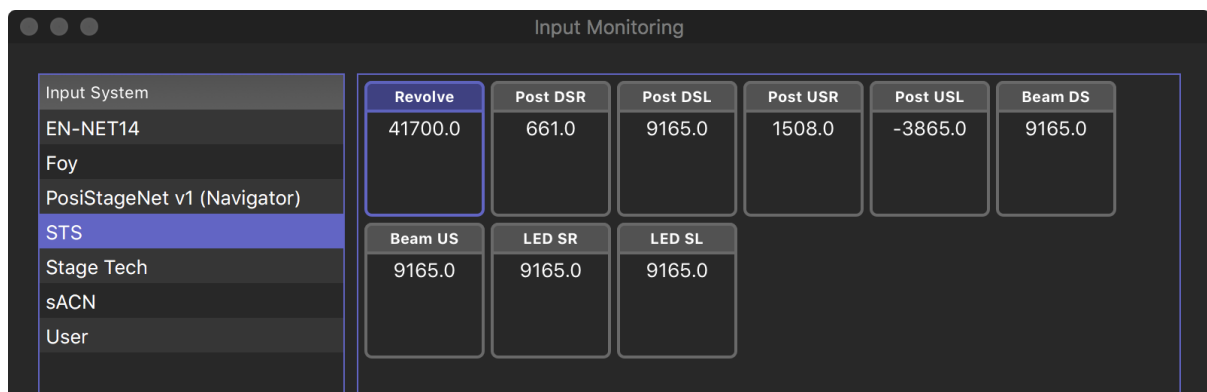


4. Auxiliary Displays

4.1 Input Monitoring

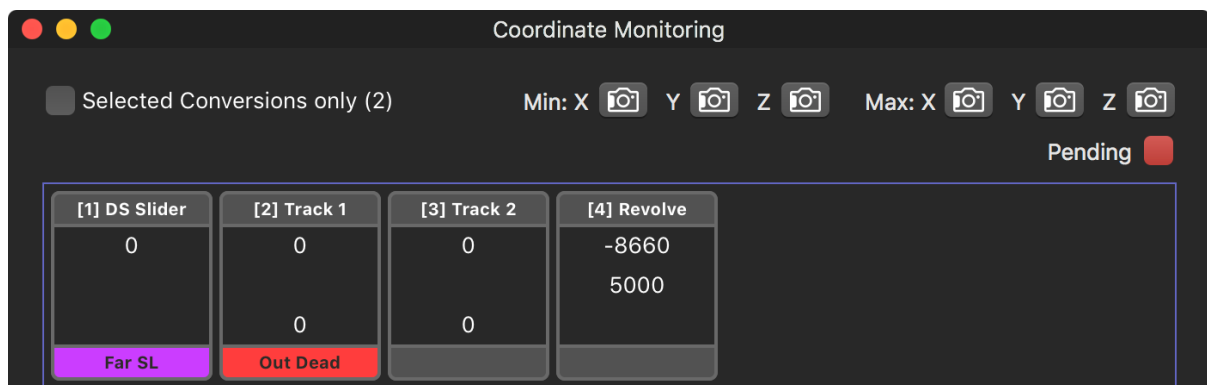
Input Monitoring allows you to quickly view all incoming positional information. The window is split into two sections, Input Systems and Inputs.

Select an Input System on the left of the window and any incoming positions will be displayed in the panel on the right. You can highlight one or more inputs by selecting them.



4.2 Coordinate Monitoring

Coordinate Monitoring allows you to quickly view all Coordinate positions. It also provides Coordinate Capture functionality.



4.2.1 Coordinate Capture

Coordinate Capture quickly and easily captures Coordinate positional information and updates Conversions which reference it. You capture data by clicking on any of the min/max capture (camera) buttons.

There are two options for capturing information, selected conversions or selected coordinates.

When a capture button is pressed, a progress bar will appear and on completion the 'Pending' indicator will change to **green**.

Selected Conversions

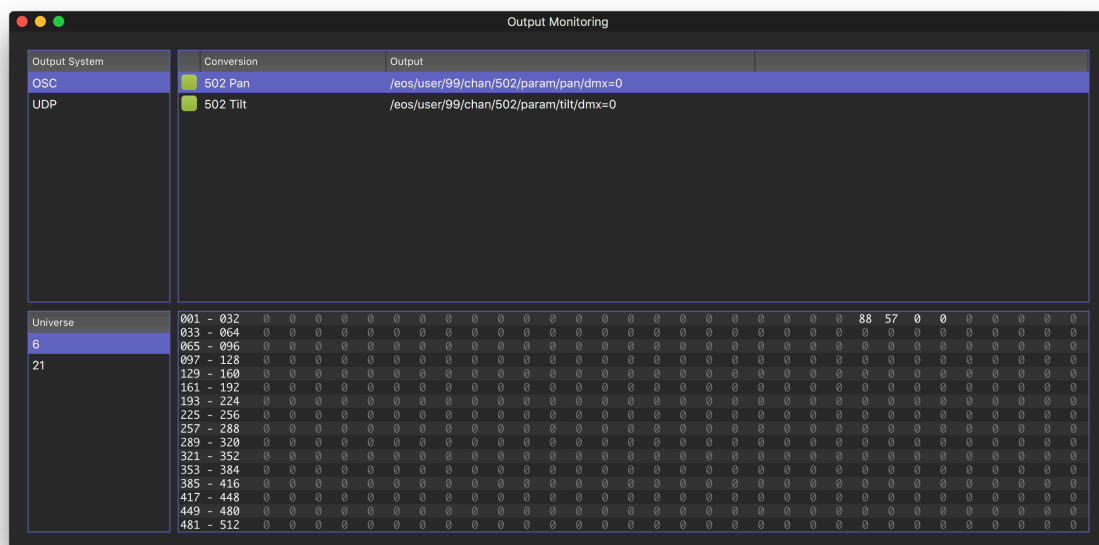
When 'Selected Conversions only' is checked, only conversions which are highlighted in the main window will be updated. Sometimes you may choose to use different min/max positions for conversions which reference the same Coordinate e.g. to allow a unit to track further off stage. In this mode, coordinates cannot be selected.

Selected Coordinates

When 'Selected Conversions only' is unchecked, you can select one or more coordinates from the pane below. All conversions referenced by the selected Coordinate(s) will be updated.

4.3 Output Monitoring

Output Monitoring allows you to quickly view all outgoing positional information. The window is split into four sections, Output Systems, Outputs, Universes and Universe Output.



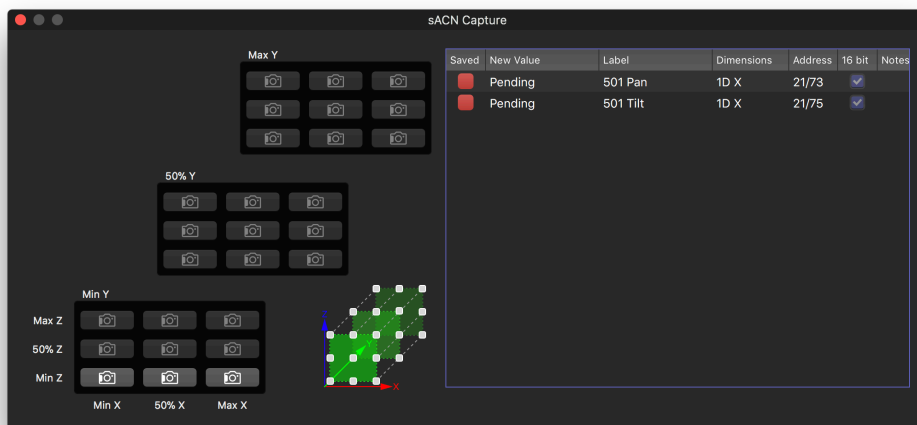
Select an Output System on the top left of the window and any outgoing conversions in that system will be displayed in the panel on the right. The traffic light output indicator on the left shows whether data output is currently enabled and the output value is displayed and updated in real time (when enabled).

Selecting a Universe in the bottom left pane will populate the bottom right pane with a grid displaying the sACN output for that universe. White numbers indicate

that the addresses are currently 'active', that is they have a per-address (DD) priority higher than zero.

4.4 sACN Capture

sACN Capture quickly and easily captures the values being output by another sACN system such as a lighting console and updates any Conversion which references them.

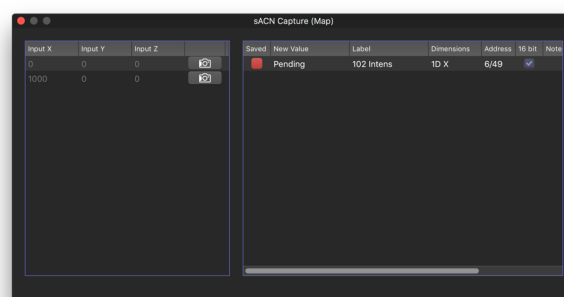


Select the Conversions you wish to update in the main window. This selection will be replicated in the sACN Capture window. Click a capture (camera) button to capture the current values and update the Conversion output value for that field. See Input/Output.

sACN Capture observes the same address and 16-bit value used for Conversion output. If you are not using sACN as the Output System for a Conversion, entering an address and setting the 16-bit mode will allow you to use sACN Capture.

Map Conversions

A variation of the sACN Capture display exists for Map Conversions. This display uses a list of points from the selected Conversions and provides capture (camera) buttons for each.



4.5 Input/Output

The Input/Output display is where the calibration information for each Conversion is entered.

There are two types of display, Array and Map.

4.5.1 Array

For each Conversion, you are required to enter at least the minimum/maximum input and minimum/maximum output for each axis to be tracked. For accurate calculations, a 50% (middle) output value is required. This is the required output when the Coordinate is at the 50% Input position indicated in the display.

The Up/Down arrow keys can be used to increment/decrement values by the Nudge Coarse value when a field is selected. Shift + Up/Down increments/decrements by the Nudge Fine value where permitted. You can also use ++ or -- to add or subtract from the previously stored value.

Example: If the current value is 10, selecting the field and typing '++10' would make the value 20.

The 3x3x3 grid of output values represents 3D space, the bottom left of the 3 boxes being the near Y positions and the top right the far Y positions.

The screenshot displays the 'sACN Input' calibration interface. It features several input fields for offsets and maximum/minimum values for X, Y, and Z axes. A 3D grid visualization is shown on the right side, representing the 3D space. The interface includes a 'Linear' checkbox and an 'Integer (DMX) Output' checkbox.

Field	Value
In X Offset	0
In Y Offset	0
In Z Offset	0
Max Y	10000
Max Z	1000
50% Z	500
Min Z	0
Min Y	-10000
Min X	-10000
50% X	0
Max X	10000
Max Y (Grid)	22610, 21175, 20009
50% Y (Grid)	22875, 20860, 18575
Min Z (Grid)	22608, 20188, 18306

Information entered falls into 3 categories: Inputs, Outputs and Offsets. Some fields may be disabled depending on the Dimension configuration for each Conversion.

Inputs

Enter the minimum and maximum Input values from the Coordinate this Conversion is tracking. You may enter any combination of X, Y and Z. These values can also be captured from the Coordinate Monitoring display.

Offsets

An Offset is used to modify the incoming location of a Coordinate. Entering a value into the text field (negative/positive) permanently offsets the value received. Alternatively, choose an sACN Input to allow desk control using the specified range. This feature is useful to follow different parts of an object, e.g. the head vs torso of a person.

Note: When Desk Control is enabled for a Conversion it will ignore any entered values and always look for sACN Input.

Logic Time (Array Intensity Conversions only)

Select an sACN Input to allow desk control of the time in which Logic Actions are applied.

Inhibit % (Array Intensity Conversions only)

Enter a proportion between 0-100 (%) to be used when inhibited by a Logic Action.

Outputs

Enter the minimum, maximum and optionally 50% (not required when using Linear) output values to be used for calculations. Depending on the Output System, you may choose to use whole Integer output (required for sACN/DMX output) or decimal output. These values can also be captured from the sACN Capture display.

Array Intensity Conversions require input in percentage (0-100). This proportion will then be applied to the level received from another sACN source such as a lighting console.

Linear

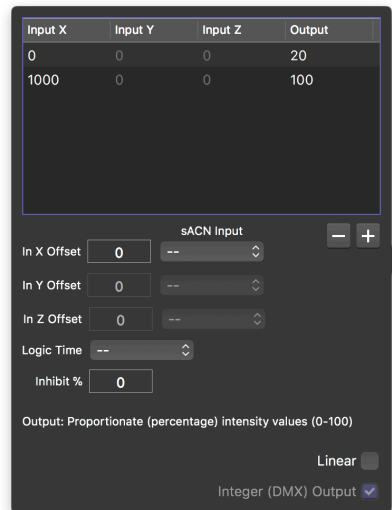
If you wish to use the simplest linear calculations for this Conversion this field should be checked. Linear calculations are not offered for 3D conversions. See Calculations and Dimensions for more information.

4.5.2 Map

For each Conversion, you are required to create at least two Map Points. Additional points will increase accuracy for unusual tracking scenarios.

The Up/Down arrow keys can be used to increment/decrement values by the Nudge Coarse value when a field is selected. Shift + Up/Down increments/decrements by the Nudge Fine value where permitted. You can also use ++ or -- to add or subtract from the previously stored value.

Example: If the current value is 10, selecting the field and typing '++10' would make the value 20.



Information entered falls into 3 categories: Inputs, Outputs and Offsets.

Input (X, Y, Z)

Enter input values to be evaluated against the Coordinate this Conversion is tracking. You may enter either X, Y or Z depending on the dimension selected.

Offsets

An Offset is used to modify the incoming location of a Coordinate. Entering a value into the text field (negative/positive) permanently offsets the value received. Alternatively, choose an sACN Input to allow desk control using the specified range. This feature is useful to follow different parts of an object, e.g. the head vs torso of a person.

Note: When Desk Control is enabled for a Conversion it will ignore any entered values and always look for sACN Input.

Logic Time (Map Intensity Conversions only)

Select an sACN Input to allow desk control of the time in which Logic Actions are applied.

Inhibit % (Map Intensity Conversions only)

Enter a proportion between 0-100 (%) to be used when inhibited by a Logic Action.

Outputs

Enter output values to be used for output calculations. Depending on the Output System, you may choose to use whole Integer output (required for sACN/DMX output) or decimal output. These values can also be captured from the sACN Capture display.

Map Intensity Conversions require input in percentage (0-100). This proportion will then be applied to the level received from another sACN source such as a lighting console.

Linear

If you wish to use the simplest linear calculations for this Conversion this field should be checked. See Calculations and Dimensions for more information.

5. Tools

The Tools menu item contains additional tools used to make changes throughout LightStrike, examples including changing the output address for all conversions.

5.1 Select

Coordinates

Can be used to select all conversions based on the Coordinate used. This is especially useful in larger rigs when used to selected conversions for sACN Capture.

5.2 Copy

Input/Output

Copy Input/Output values from one Conversion to another selection of Conversions. Select the Conversion you wish to copy from prior to selecting the menu item. When the window opens the label of the selected Conversion is displayed, you can then select one or more Conversions in the main window.

By default, offsets and timing are not copied, but they can be included by selecting the checkbox before pressing 'Copy'.

5.3 Modify

Address (Control)

Enter the existing control address you wish to replace. LightStrike will display the number of conversions using this control address. Entering a new address and clicking 'Replace' will update all conversions.

Address (Output)

Enter the existing output address you wish to replace. LightStrike will display the number of conversions using this output address. Entering a new address and clicking 'Replace' will update all conversions.

Output (Offset)

Modifies the output values for all selected Conversions by offsetting each value by the amount entered.

When a mixture of Conversion types are selected, any limits required (DMX, intensity etc) will be preserved. It is recommended a single type of Conversion is selected when using this tool.

Example: A fixture is replaced and as a quick fix, all pan values need to be adjusted by -50 DMX.

Output (Absolute)

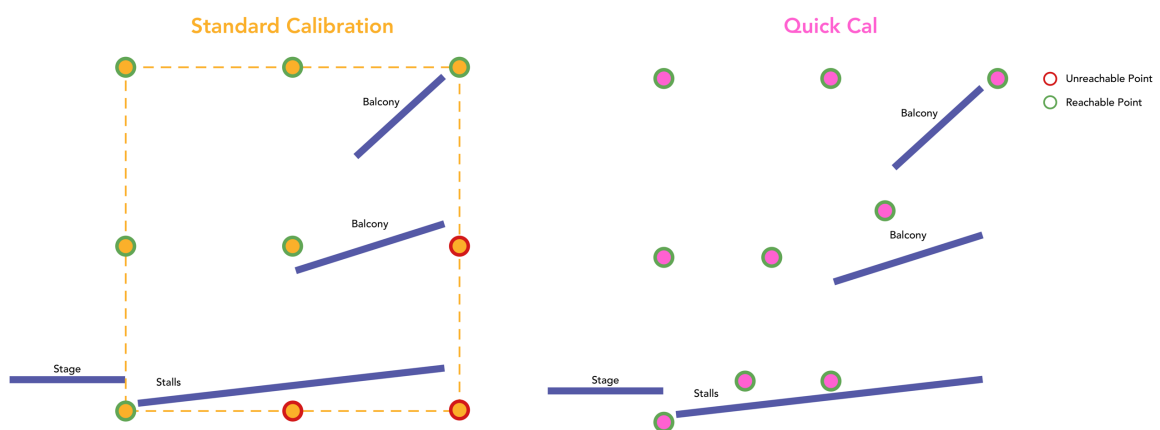
Replaces the output values for all selected Conversions with the value entered.

When a mixture of Conversion types are selected, any limits required (DMX, intensity etc) will be preserved. It is recommended a single type of Conversion is selected when using this tool.

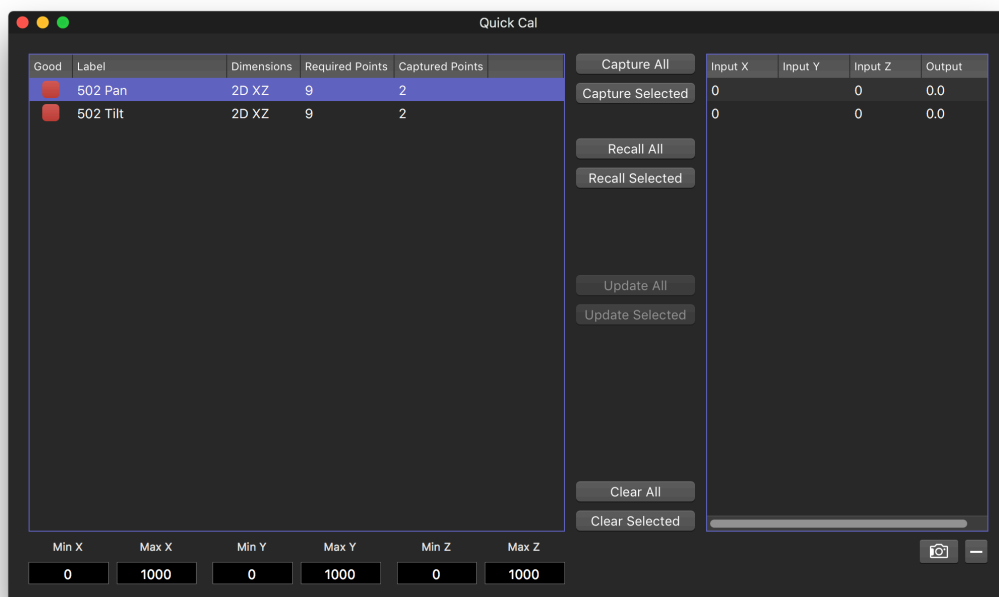
5.4 Quick Cal

Quick Cal is designed for situations where it is difficult or impossible to locate the calibration points required to create a rectangle (2D) or cuboid (3D). This is particularly common in theatrical spaces where the stage or auditorium may have an unusual shape.

As LightStrike requires parallel sides for calibration Quick Cal overcomes this by interpolating a given set of points to calculate the points required. Whilst you still need to get the same number of calibration points (3, 9 or 27), they can be distributed unevenly.



Note: The closer together the points are, the less accurate the final result will be. It is recommended to capture points at the greatest possible extents.



Using Quick Cal

Select the Conversions you wish to capture or update in the main window. This selection will be replicated in the Quick Cal window.

Quick Cal observes the same address and 16-bit value used for Conversion output. If you are not using sACN as the Output System for a Conversion, entering an address and setting the 16-bit mode will allow you to use Quick Cal.

Capture

Captures the current Coordinate position and sACN level for either all Conversions visible in the Quick Cal window or the selected Conversion.

The main table tells you how many points have been captured for each Conversion and how many points are required (based on dimensions). Once sufficient points have been captured the 'Good' indicator turns green. This does not signify that the points are able to be interpolated merely that an attempt might be made when you select Update.

Recall

Recalls the existing input/output information stored for either all Conversions visible in the Quick Cal window or the selected Conversion. This will generate either 3, 9 or 27 calibration points (depending on dimensions) and will overwrite any existing points captured.

Update

Attempt to update the output values (see Input/Output) for either all Conversions visible in the Quick Cal window or the selected Conversion.

Clear

Removes existing calibration points for either all Conversions visible in the Quick Cal window or the selected Conversion.

Remove Point

It is possible to remove one or more calibration points by selecting them and clicking the 'minus' button.

Capture Output

It is possible to recapture only the output for one or more calibration points by selecting them and clicking the capture (camera) button. The input will not be affected.

Min/Max Input

The min/max text fields allow you to update the input min/max values for all Conversions visible in the Quick Cal window. It is important that the min/max values are outside or equal to the possible area you wish to track.

6. Additional Information

6.1 OSC

You can send commands to LightStrike from an OSC output device to control certain basic functions.

Input

Quit LightStrike	/lightstrike/system/quit/primary
Shutdown Mac	/lightstrike/system/shutdown/primary
Start Output	/lightstrike/output/start/primary
Stop Output	/lightstrike/output/stop/primary

Note: Replace Primary with Backup to perform the action on the backup device. If using a standalone system, also use Primary.

Output

LightStrike outputs OSC over UDP to the specified port. The syntax depends on which device you are sending to.

For Eos-family consoles you may wish to use the syntax below:

```
/eos/user/99/chan/1000/param/pan/dmx=%@  
/eos/user/99/chan/1000/param/tilt/dmx=%@
```

You should always target a user which is not being actively used as LightStrike sends values at a high rate. This user must also 'exist' in the show file, so ensure you have created it in Eos Desk Setup.

6.2 Logging

LightStrike keeps comprehensive logs of user and system actions. In the unlikely event of show file issues, or systems crashes, full logs can be exported from the File menu.

Please email logs to support@lightstrikeapp.com