

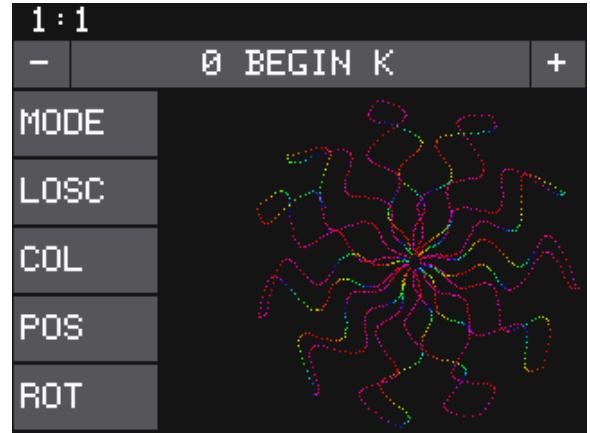
# Laserbox User Guide

Laserbox is firmware for the toolbox synthesizer module by 1010music. You can learn how to install new firmware on our forum here:

<https://forum.1010music.com/forum/products/firmware-downloads/511-how-to-install-firmware-on-toolbox>

You can find the download link for laserbox on our forum after you have registered for the forum and clicked the email link to validate your account: <https://forum.1010music.com/forum/products/firmware-downloads>

With laserbox, you can drive a laser by generating patterns, using premade image wave files, or via CV signals received from other Eurorack modules. You can also use external CV signals to modulate the signals sent to the laser. You can use modulation to control the shape of the wave signal, the colors, the position of the projection, and the rotation of the projection. Laserbox lets you see the impact of your tweaks on the image by displaying a preview on screen. This allows you to design your laser show while the laser is disconnected, and save the settings you like as presets.



## What You Need

You can try out laserbox by installing the laserbox firmware on a toolbox Eurorack module and watching the preview. When you are ready to send the signal to a laser, you will need the following:

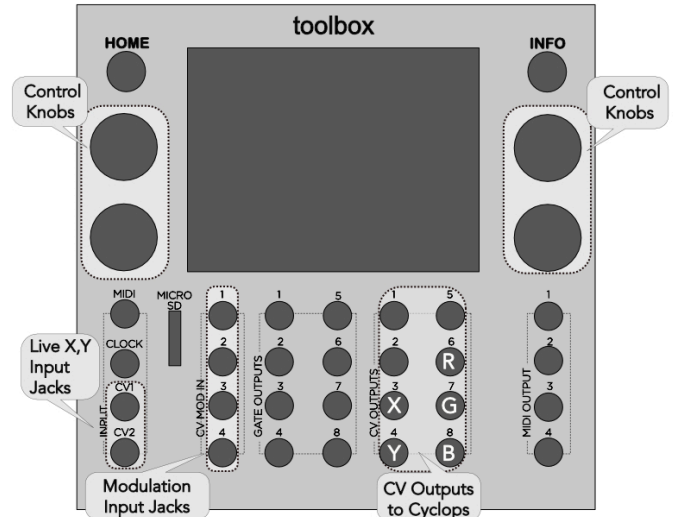
- Cyclops module by LZx Industries
- Laser that supports ILDA input
- 5 mini TS cables (patch cords)

Alternatively, Laserbox could be used to drive any device that accepts +/-5 Volt CV signals for X and Y Coordinates, along with R, G, and B color signals.

## Laserbox Outputs

Laserbox sends X, Y, R, G and B signals through the control voltage outputs on the front panel of toolbox. Connect the following outputs of Control Box to the indicated inputs of the Cyclops module:

<u>Toolbox Output</u>	<u>Cyclops Input</u>
CV Output 3	X
CV Output 4	Y
CV Output 6	R
CV Output 7	G
CV Output 8	B



## Presets

Toolbox comes with a number of presets that demonstrate some of the capabilities of laserbox. The preset name is displayed at the top of the screen. You can advance through the presets by touching the "-" and "+" buttons on either side of the preset name. You can select from a list of presets by touching the name of the preset. This will display the Preset management screen where you can use the control knobs to scroll through the list of available presets, and then touch **LOAD** to open the selected preset. You can work use the Preset management screen to save changes to your preset, rename a preset, or create a new preset. Note: laserbox does not automatically save your changes as you work. You must manually save your work before switching presets or turning of the module or else your work will be lost.

# Laserbox Modes

Laserbox supports several different modes for generating laser projection signals:

**PATXYZ** Oscillators generate values for Cartesian coordinates (X and Y) to drive a pattern. You can choose different waveforms to control the X and the Y position of the laser over time. You can then modulate the frequency, amplitude and phase of each waveform.

**PATRAZ** Oscillators generate values for Polar coordinates (radius and angle) to drive a pattern. You can choose independent waveforms to control the radius and the angle of the laser over time. You can then modulate the frequency, amplitude and phase of each waveform

**WAVE** Laserbox gets the signal for the coordinates from a WAV file. You will have to use a third party tool to create the WAV file.

**LIVE** Laserbox takes in CV signals for X, Y, R, G and B and uses these to generate the output signal.

In all of these modes, laserbox also lets you control the color, position, scale and rotation of the signal. You can use external Control Voltage signals and internal LFOs to modulate the parameters for each of these, or manually dial in the values using the control knobs. Laserbox displays a preview of the projection on the home screen and on all of the parameter screens, so you can immediately see the impact of the changes you are making.

## Waveforms for PATXYZ and PATRAZ Modes

When you are using PATXYZ or PATRAZ mode, the home screen will display an either a **PATXYZ** or **PATRAZ** button, to match the selected mode. Touch this button to display the first Oscillator parameters screen. Press the **INFO** button to cycle through the oscillators for the selected mode. In PATXYZ mode, there will be oscillators for the X and the Y coordinates. In PATRAZ mode, there will be oscillators for the Radius and the Angle. You can configure the following parameters for each oscillator:

- Waveform
- Frequency (can be modulated)
- Amplitude (can be modulated)
- Phase (can be modulated)

Press **HOME** when you are ready to return to the Main screen.

## WAV File Selection

When you are using WAVE mode, the home screen displays a **WAVE** button. Touch this button on the main screen to choose the wave file to be used. Touch the name of the wave file in the top of the screen to display the file selection window. Choose a WAV file from the microSD card by scrolling through the choices with the control knobs and then touching **Load**. Press **HOME** to return to the main screen.

## Live Mode Inputs

When you are using LIVE mode, you will need to connect two CV signals into toolbox. Use mini TS cables to connect the signals as follows:

<b><u>Toolbox Input</u></b>	<b><u>Laser Signal</u></b>
CV1	X
CV2	Y

Laserbox takes a +/- 5 Volt control voltage signal as input. The X and Y values input through these signals provide a starting point for the calculations used to control the outputs to the laser. The Color, Position, Scale and Rotation parameters of laserbox are combined with the input signals to generate the output to the laser.

## Color

All preset modes allow you to control the color of the signal. Touch the **COL** button on the Main screen to display the color parameters screen. Press INFO to cycle through the parameters pages for the color parameters. You can configure the following parameters on this screen:

- Hue (can be modulated)
- Saturation (can be modulated)
- Rate
- Amount
- Waveform

The waveform parameter allows you to select a signal that will vary the color over time. Use this together with Rate and Amount to control the waveform.

## Position and Scale

Touch the **POS** button on the Main screen to control the position and scale of the projection. Press the INFO button to cycle through the position and scale parameters pages.

The **X Scale** and **Y Scale** parameters adjust the size of the projection by stretching it along the X or Y axis. The **Z Scale** parameter makes it look like the image is zooming in or out along the Z axis by scaling the image along both the X and Y axes simultaneously.

The position parameters, **X Pos** and **Y Pos**, allow you to move the image around within the range of the laser. When the position puts the signal too close to the edge of the laser's range, the pattern will compress against the edge and become distorted.

All of the scale and position parameters can be modulated.

## Rotation

Touch the **ROT** button on the main screen to control the rotation of the image along the Z axis. Imagine a pole going through the center of the laser projection area coming straight out of the wall towards you. Z Axis rotation causes the image to spin around that pole. You can control the Z rotation directly by the Z Axis value. You can use a waveform to control the rotation by setting the Z Oscillator Amount and Z Oscillator Rate parameters.

All of the rotation parameters can be modulated.

## Modulation

Laserbox supports modulation using external control voltage signals. Plug a +/- 5V CV signal into the CV MOD IN TS jacks to control the ExtX modulation signals as follows:

<u>Toolbox Input Jack</u>	<u>Modulation Source</u>
CV MOD IN 1	Ext1
CV MOD IN 2	Ext2
CV MOD IN 3	Ext3
CV MOD IN 4	Ext4

You can apply modulation to any parameter that has three black boxes above parameters in the top row or below parameters in the bottom row. Touch one of these modulation boxes and laserbox displays the Modulation Source parameters. Select a modulation Source (Ext1 through Ext4) and then specify the Amount of impact the source will have on the parameter. Configure an external source to drive a signal to the corresponding CV MOD IN jack, and the parameter value will vary with the CV input signal. For example, you can make the size of the projection pulse in and out over time by using a sinusoidal input to modulate the Z Scale parameter.

## Learn More

Check for updates to this manual at <https://1010music.com/laserbox-documentation-and-software>.

Find community support, wish lists, firmware updates, and alternate firmware on our forum at <https://forum.1010music.com>.