COLOR CHORDS
OWNER'S MANUAL

COLOR CHORDS

ADDITIVE LAYER PRIORITY MIXER

α   α

RGB   RGB

LAYER 4   LAYER 3   LAYER 2   LAYER 1   OUT

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RED, GREEN & BLUE TRIPLETS

The name Color Chords is a reference to the work of video synthesis pioneer Stephen Beck, who developed the Direct Video Instrument One (DV #1) in 1971. Beck's work has been a tremendous source of inspiration to us over the years, especially his conceptual thinking about the video synthesizer as an artistic instrument. Rather than a focus technical and engineering functional blocks such as mixers, VCOs, and so on, he created an instrument with artistic principles in mind: form, texture, and color. It is with this same mindset that we are designing our current series of video synthesis modules.

The "color chord" modules in Beck's instrument introduced the video synthesis concept of a shape being mixed to Red, Green & Blue color channels using a matrix mixer as a compositional tool.   While our design is quite different from the modules in the Direct Video Instrument One, the spirit of the idea lives on through Color Chords.

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FEATURES

Color Chords is a four channel summing matrix designed to mix shapes, patterns and keys into a color output image. RGB mixing is a foundational building block of video synthesis, and Color Chords introduces a new feature to the traditional workflow with the addition of opacity controls and layer priority. When the opacity of one layer is turned up, the brightness of the previous layers decreases, allowing mix elements to sit on top of, beneath, or in between each other.

▶ Three monochromatic signal inputs with red, green, blue and opacity level controls.

▶ Single RGB input channel allows endless chaining of multiple Color Chords or other RGB processing modules.

▶ All signal paths perform at high frequency, video rate speeds.

SPECIFICATIONS

Format	EuroRack Synthesizer Module
EuroRack Width	16HP
Mounting Depth	1.25 inches (31.75 mm)
Frontpanel Dimensions	3.185 inches (80.9 mm) * 5.059 inches (128.5 mm)
+12V Power Consumption	60mA
-12V Power Consumption	60mA
Series Output Resistance	499 ohms
Input Termination Resistance	100K ohms
Voltage Levels (Expected)	0-1V DC
Voltage Levels (Absolute Maximum)	+/-12V DC

USER CONTROLS & CONNECTIONS

1 Red channel level controls for layers 1, 2 and 3. Set fully clockwise, the layer input is mixed into the Red output (8) at 100% gain. Fully counter-clockwise, and the input is at 0%.

2 Green channel level controls. Functions as (1) for the Green output mix (9.)

3 Blue channel level controls. Functions as (1) for the Blue output mix (10.)

4 Opacity controls for layers 1, 2 and 3. When fully down, opacity is set to 0% for the associated layer. This layer's input will overlap with the previous layers and create an additive mix. When fully up, opacity is set to 100%. The associated layer input will be subtracted from all previous layers allowing the selected layer to appear on top of those layers below it. For example, layer 2 input will be subtracted from layers 3 and 4 with opacity control at 100%.

5 Red channel input to layer 4. 0-1V DC expected.

6 Green channel input to layer 4. 0-1V DC expect-

7 Blue channel input to layer 4. 0-1V DC expected.

8 Red channel mix output. 0-1V DC typical.

9 Green channel mix output. 0-1V DC typical.

10 Blue channel mix output. 0-1V DC typical.

11 Layer 3 source input. 0-1V DC expected. This layer subtracts from layer 4 when opacity is up.

12 Layer 2 source input. 0-1V DC expected. This layer subtracts from layers 3 & 4 when opacity is up.

13 Layer 3 source input. 0-1V DC expected. This layer subtracts from layers 2, 3 & 4 when opacity is up.

BLOCK DIAGRAM

Layer 1 In

Layer 2 In

Layer 3 In

Layer 4 In

Opacity
Processors

4-Channel
RGB Matrix
Mixer

Red Out

Green Out

Blue Out
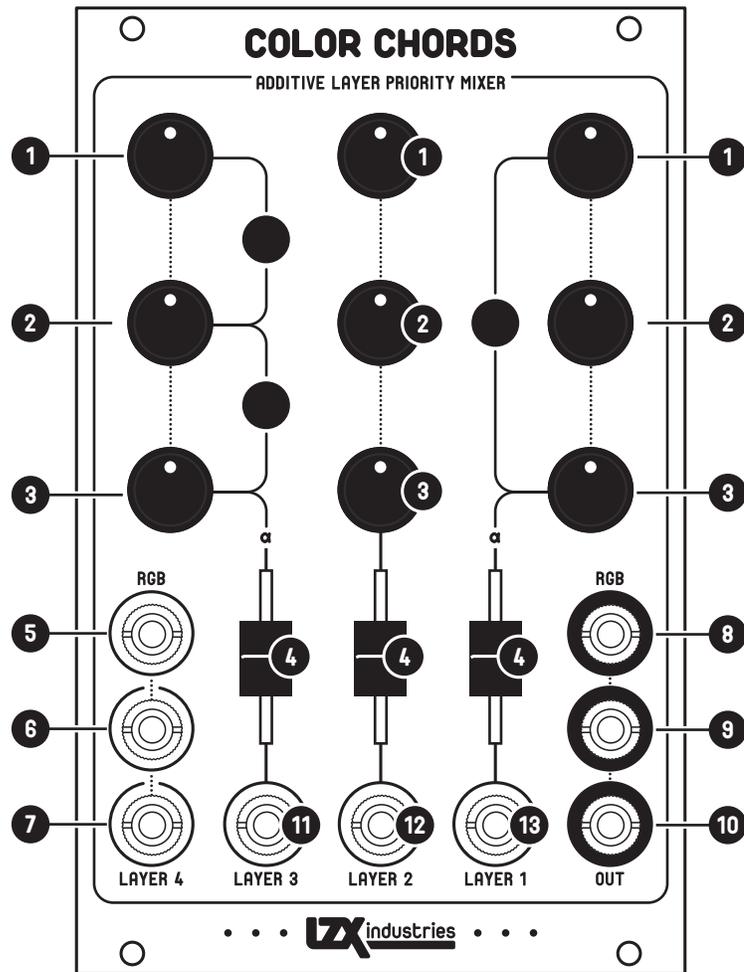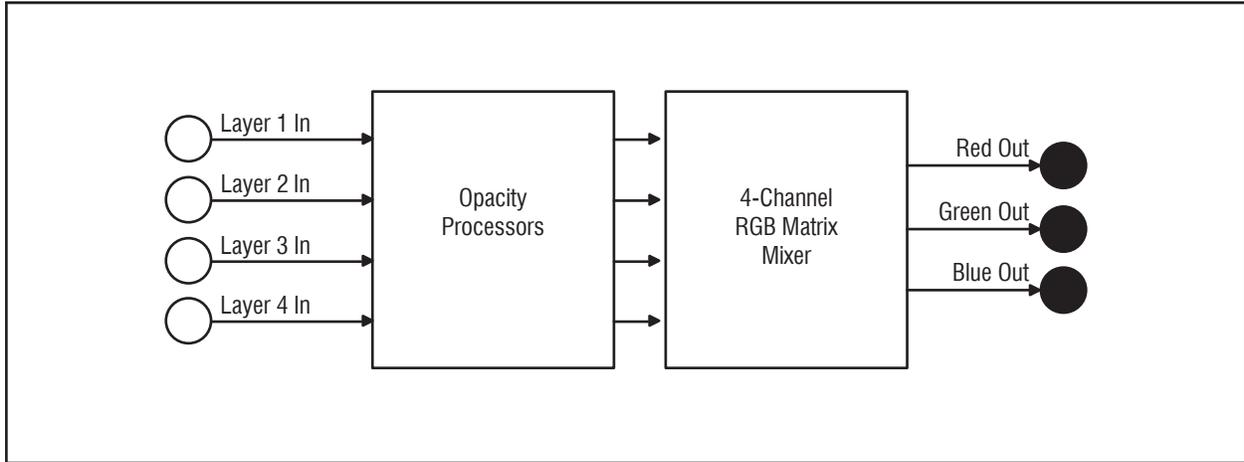
INSTALLATION

Power down your EuroRack case and disconnect it from AC power outlet while installing new modules.

Remove the module from its packaging and connect the 16-pin power cable to the keyed power entry header on the rear of the module as shown. Connect the other end of the power cable to an empty connector on your EuroRack power distribution busboard. Ensure pin 1 (-12V, with the red stripe) is oriented as indicated on your power distribution busboard.

EuroRack module.

EuroRack 16-pin power cable.

EuroRack power distribution bus board.

Red stripe on cable lines up with -12V on bus board.

Power input header.
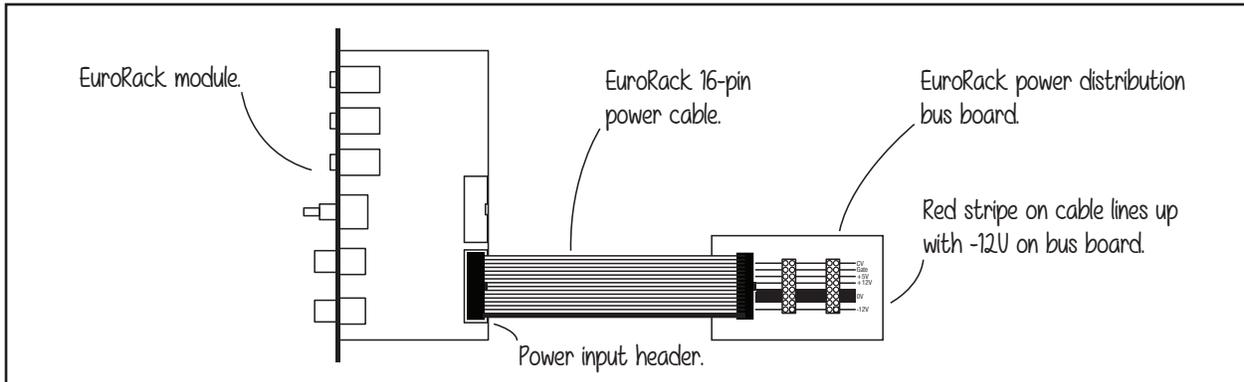
After connecting the power cable, mount the module frontpanel flush to your enclosure's EuroRack mounting rails and secure the module with the mounting screws provided by your enclosure's manufacturer.

EuroRack rail mounting screws.
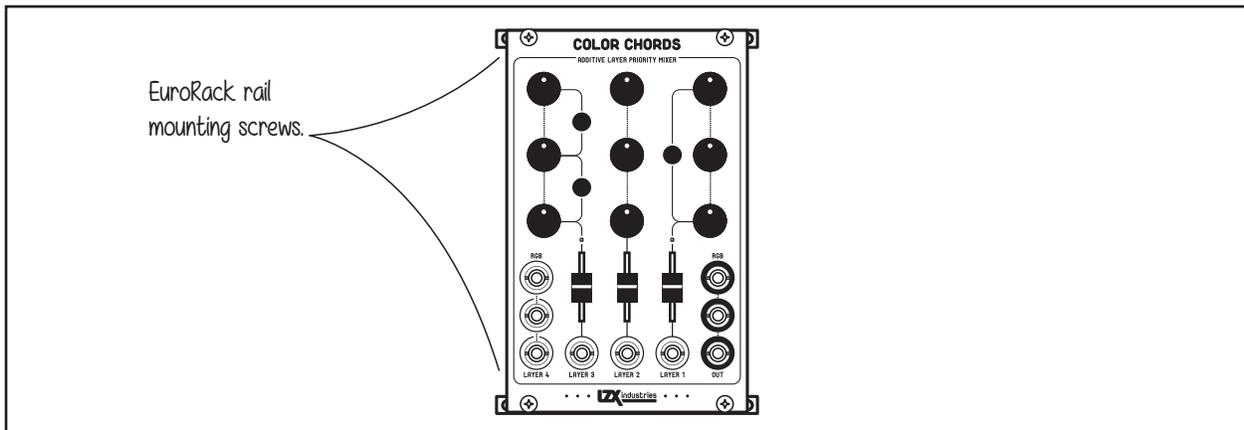
EXAMPLE PATCHES

COLOR SHAPE, KEY & PATTERN MIXER

Color Chords' primary intended usage is to create a full color RGB mix of various pattern, shapes, and keys that exist in a monochromatic state. For example, waveform outputs from oscillators to create patterns, or key generators being fed ramp signals to generate shapes. This patch sets up Color Chords to output to the A channel input of Visual Cortex's output compositor. Not shown are signals to be input to Color Chords. If Visual Cortex is your only source, try feeding Color Chords with ramp generator outputs, external video signals from the Cortex input decoder, or a key/shape being generated from the animation and key generator section.
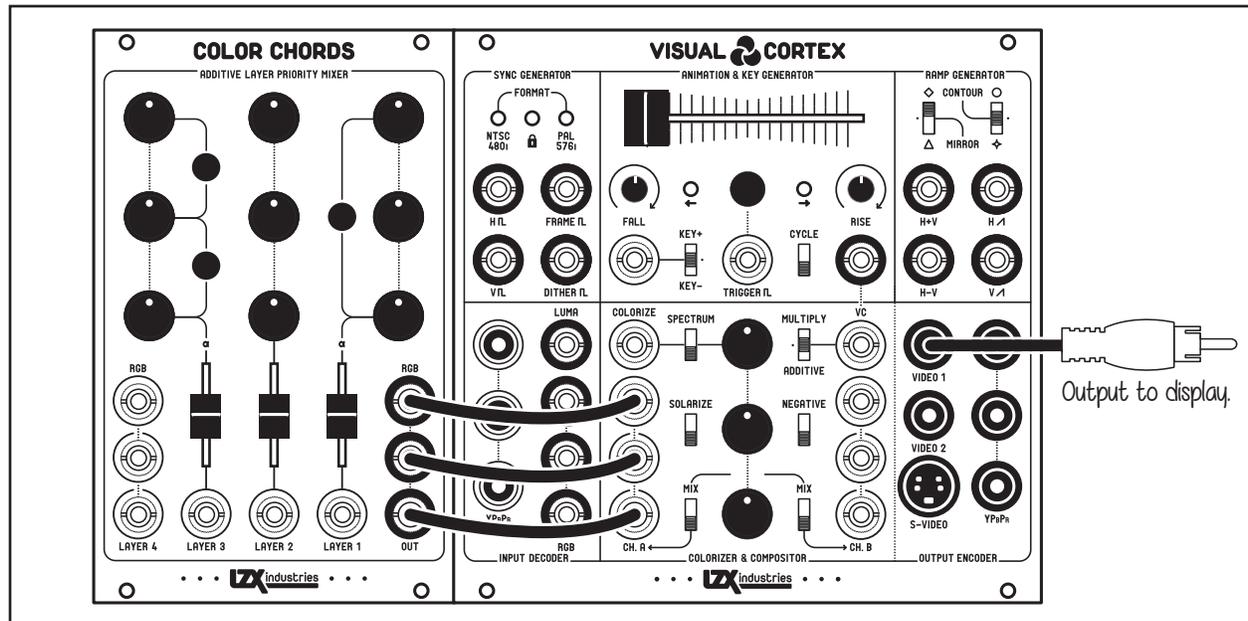
Further exercises and experiments to explore using this patch as a starting point:

▶ Start experimenting with opacity controls all the way down, at 0%. The RGB controls will mix the inputs on top of each other. Then play with the opacity controls to see how they effect the lowers below the one being adjusted.

▶ Don't restrict yourself to static elements, also try patching low frequency control signals from Sensory Translator or Prismatic Ray (in LFO mode) to modulate the depth of an element in the mix.

▶ The layer 4 inputs allow you to pass another full RGB mix into Color Chords as a background layer. This feature unlocks the ability to chain multiple Color Chords modules together in parallel, creating a 7-layer mixer, 10-layer mixer, and so on.

▶ Use two Color Chords, each feeding the A and B input channels of Visual Cortex, but send them the same layer inputs in parallel. This allows you to program 2 alternate using the same sources and composite between them using Cortex.

▶ Passage makes a great pre- or post-processor for Color Chords. Try patching its three outputs into layer 4, or patch Color Chords' three outputs into the IN or THRU inputs on Passage.

▶ Mapper also makes a great companion to Color Chords. As a pre-processor, it allows layer 4 to operate in the hue, saturation and brightness colorspace instead of the RGB colorspace. As a post-processor, the RGB controls on Color Chords will define hue, saturation, and brightness values instead of RGB.

MANUFACTURER'S WARRANTY

Fully assembled versions of this product are covered by our manufacturer warranty for one year following the date of manufacture. This warranty covers any defect in the manufacturing of this product., such as assembly errors or faulty components. This warranty does not cover any damage or malfunction caused by incorrect use – such as, but not limited to, power cables connected backwards, excessive voltage levels, or exposure to extreme temperature or moisture levels. The warranty covers replacement or repair, as decided by the manufacturer. Please contact customer service via our website at www.lzxindustries.net for instructions on returning the product. The cost of returning a product for repair or replacement is paid for by the customer.

DIY kits and bare printed circuit boards are not covered under any warranty and come with no guarantee of assembly troubleshooting or customer support. However, we are nice and will help you when possible. Please contact us if you have questions about or problems with your build.