

COLORSYNTH OWNERS MANUAL

09-15-09

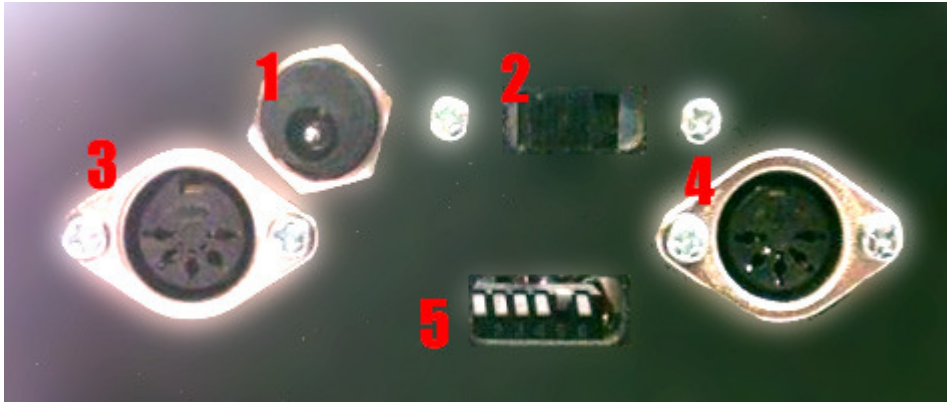


COLORSYNTH CONCEPT

ColorSynths are stage lighting effects, designed by and for electronic musicians. They translate MIDI messages into light and colors. Using a ColorSynth can be as simple as plugging it into the MIDI out port of your favorite keyboard, electronic drum kit, or other MIDI capable device. Advanced users can use software such as Ableton Live, Max/MSP, PureData and others to create complex lighting sequences.

For the electronic musician, ColorSynths offer a great advantage over current conventional lighting effects, as they do not require DMX hardware or software to operate. Simply connect to power and a MIDI source, and your ColorSynth is ready to add the most crucial element to your live musical performance - pretty, colorful blinky lights.

HARDWARE

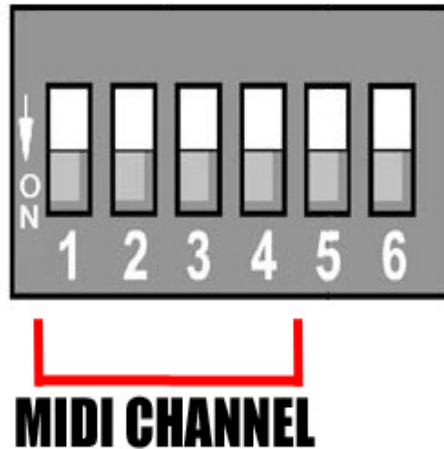


The vibrant colors and intense light of the ColorSynths come from a high power RGB LED, which is mounted on a heat sink inside of the enclosure. The enclosure is made of ABS plastic, and is combination hand/machine crafted in San Francisco, CA by **KOMEGA** (<http://www.komegamusic.com>)

The back of the ColorSynth fixture features the following connections and switches:

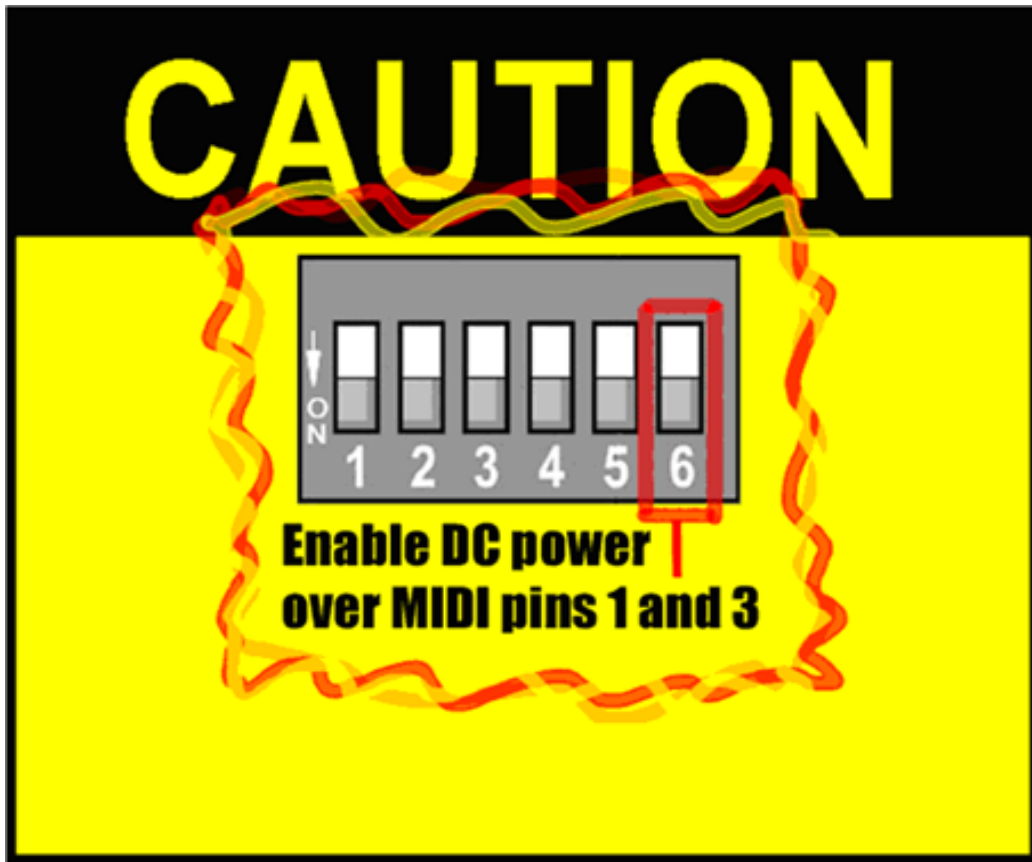
- 1) A 2.5mm DC power connector, accepts 11-15V DC (center +)
- 2) A dual purpose on/off switch. When in the **LEFT** position, the ColorSynth accepts power from pins 1 and 3 of the MIDI input connector (#3 above). When using DC power, this turns the ColorSynth OFF. When in the **RIGHT** position, the ColorSynth accepts power from the DC power connect (#1 above). This turns the ColorSynth OFF when using MIDI power.
- 3) MIDI IN connector, pins 2 and 4 receive MIDI per the MIDI specification, pins 1 and 3 receive DC power from other ColorSynths.
- 4) MIDI OUT/THRU. All MIDI data is passed to pins 2 and 4 per the MIDI specification. Pins 1 and 3 pass DC power when the 6th dipswitch is in the on (down) position.

5) SIX position DIP switch. Switches in the **DOWN** position are considered **ON**. Switches in the **UP** position are considered **OFF**.



Switches 1-4 determine the MIDI channel that the ColorSynth responds to. Here is a handy cheat sheet to help you select the proper switches for your channel, remember that **ON = DOWN, OFF = UP**:

MIDI Channel	DIP Switch positions			
	1	2	3	4
1	on	on	on	on
2	on	on	on	off
3	on	on	off	on
4	on	on	off	off
5	on	off	on	on
6	on	off	on	off
7	on	off	off	on
8	on	off	off	off
9	off	on	on	on
10	off	on	on	off
11	off	on	off	on
12	off	on	off	off
13	off	off	on	on
14	off	off	on	off
15	off	off	off	on
16	off	off	off	off



**** SAFETY PRECAUTIONS ****

DC POWER OVER MIDI PINS 1 AND 3

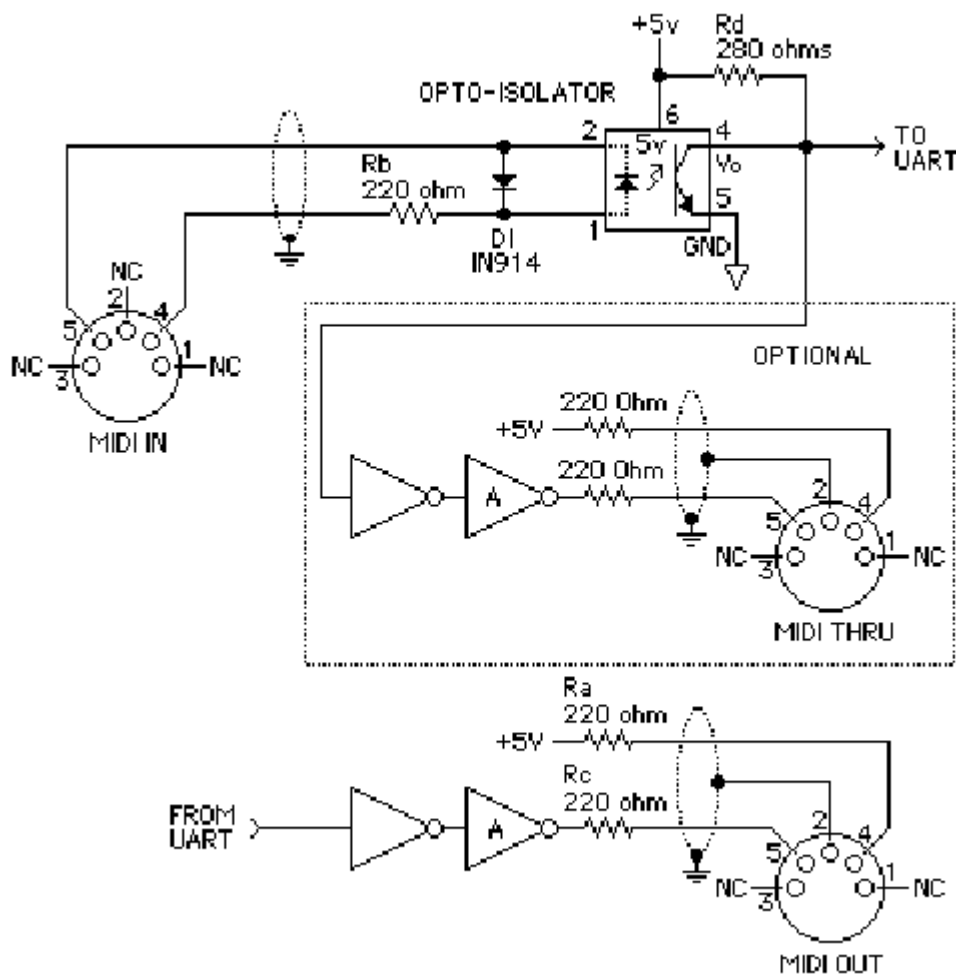
When in the DOWN/ON position, the 6th dip switch on the ColorSynth connects pins 1 and 3 of the MIDI OUT/THRU connector to the positive and negative rails of the ColorSynths DC power input. Because ColorSynths can accept power from pins 1 and 3 of the MIDI IN port, this enables you to power multiple ColorSynths from a single power supply, effectively chaining power and MIDI with standard MIDI cables. It is important to use this feature with caution, as with any electrical device you shouldn't try to exceed the current ratings of the equipment and the cables that draw power.

Each ColorSynth draws approximately 450mA of current, so a 1amp power supply would be required to power two ColorSynths, and a 2 amp power supply would be required to power four ColorSynths.

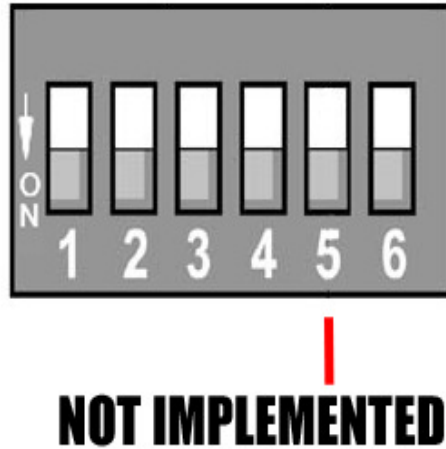
You should NEVER power more than four ColorSynths from a single power supply no matter what the current rating.

AVOIDING PROBLEMS WITH MIDI POWER AND OTHER MIDI DEVICES

According to the MIDI Electrical Specification below (and available at <http://www.midi.org/techspecs/electrispec.php>) pins 1 and 3 in any MIDI device are supposed to be "NC" or NOT CONNECTED. The ColorSynth is a perfect example of a MIDI device that ignores this implementation. **IF YOU WISH TO CONNECT OTHER MIDI DEVICES TO THE OUTPUT OF YOUR COLORSYNTH, IT IS STRONGLY RECOMENDED THAT YOU DISABLE MIDI POWER.**

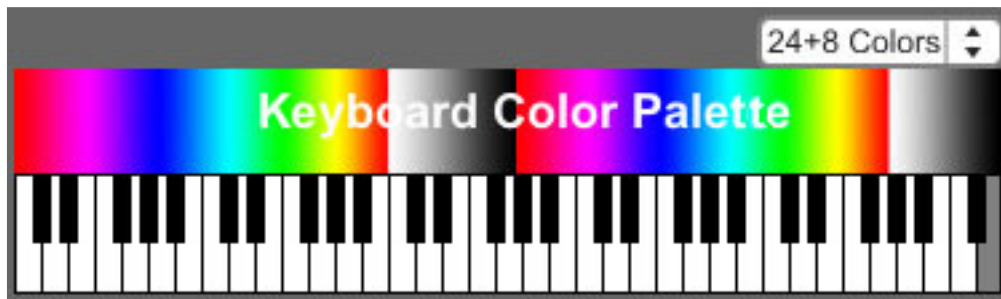


Switch 5 is currently not implemented. Future firmware updates may or may not incorporate this switch.



MIDI IMPLEMENTATION

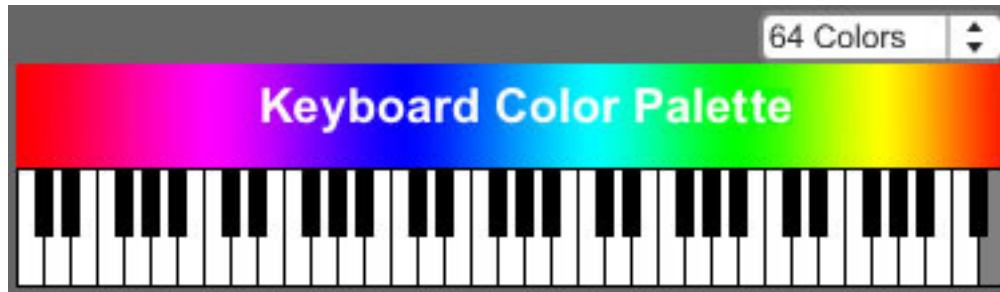
Note ON events – ColorSynths ignore “Note OFF” events, and instead map all note ON events to one of four palettes, selectable by program changes and CC 23, values 0-3 repeating.



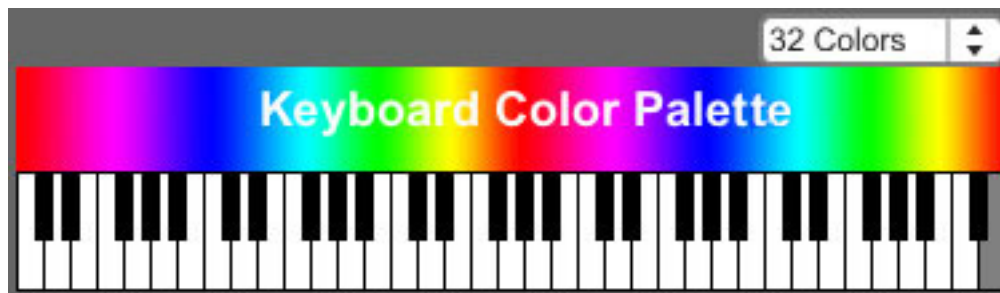
This is the default palette, comprised of 24 colors and 8 shades of white to black (off). A program change or CC 23 value of (0, 4, 8, 12 etc) will select this Palette.



This is the 128 color palette, selectable by a program change or CC 23 value of (1, 5, 9, 13 etc).



This is the 64 color palette, selectable by a program change or CC 23 value of (2, 6, 10, 14 etc).



This is the 32 color palette, selectable by a program change or CC 23 value of (3, 7, 11, 15 etc).

Note Velocity – Each note that a ColorSynth receives changes the current color that it illuminates. The velocity of the note determines how quickly the new color is applied. Softer notes can take several seconds to adjust the current color RGB values to the new note's color. Harder notes will cause faster and more instant changes. This creates a very dynamic performance of color that compliments the playing style of many modern keyboard instruments.

Continuous Controllers – Usually mapped to a slider on a keyboard controller, an expression pedal on a foot controller, or an envelope in a DAW software application, continuous controllers offer very fine and detailed methods for controlling your ColorSynth. Here is a list of continuous controller messages that are supported by the ColorSynth:

Controller	Function
(CC 1)	Strobing
(CC 3)	RGB Color Slider
(CC 14)	Red level
(CC 15)	Green level
(CC 16)	Blue level
(CC 17)	Master level
(CC 19)	Blackout
(CC 20)	Red Oscillator
(CC 21)	Green Oscillator
(CC 22)	Blue Oscillator
(CC 23)	Keyboard Palette Sel
(CC 25)	MIDI Channel Eavesdropping
(CC 26)	Reset Osc/Strobe
(CC 27)	Reset and Blackout

Strobing – Turns the ColorSynth on and off very quickly. Since CC1 is mapped to the modulation wheel of most keyboard controllers, it was decided that smaller values should cause faster strobing, while larger values should be slower. Strobing is accomplished by applying a square wave to the master level (CC17).

Color Slider – Uses the same color table as the 128 color Note palette. A simple way to get to a wide range of colors, great for smooth ramps.

Red, Green and Blue levels – Allows you to set your own RGB levels directly.

Master Level – analogous to the master fader on a mixer, this control lets you dim all three RGB values simultaneously. 127 = full bright, 0 = off. It

should be noted that this is not a proportional adjustment between RGB channels. The math behind it is $(127 - CC17)$ subtracted from each of the RGB channels.

Red, Green and Blue Oscillators – putting the “SYNTH” in ColorSynth, these are triangle oscillators that are applied to the RGB channels respectively. Smaller values are slower, larger values are faster. Use these Oscillators to create fade and ramp effects without eating up precious MIDI data bandwidth.

Palette Selector – Four values repeating (0-3, 4-7 ... Etc) that choose between the four Note event color palettes mentioned above.

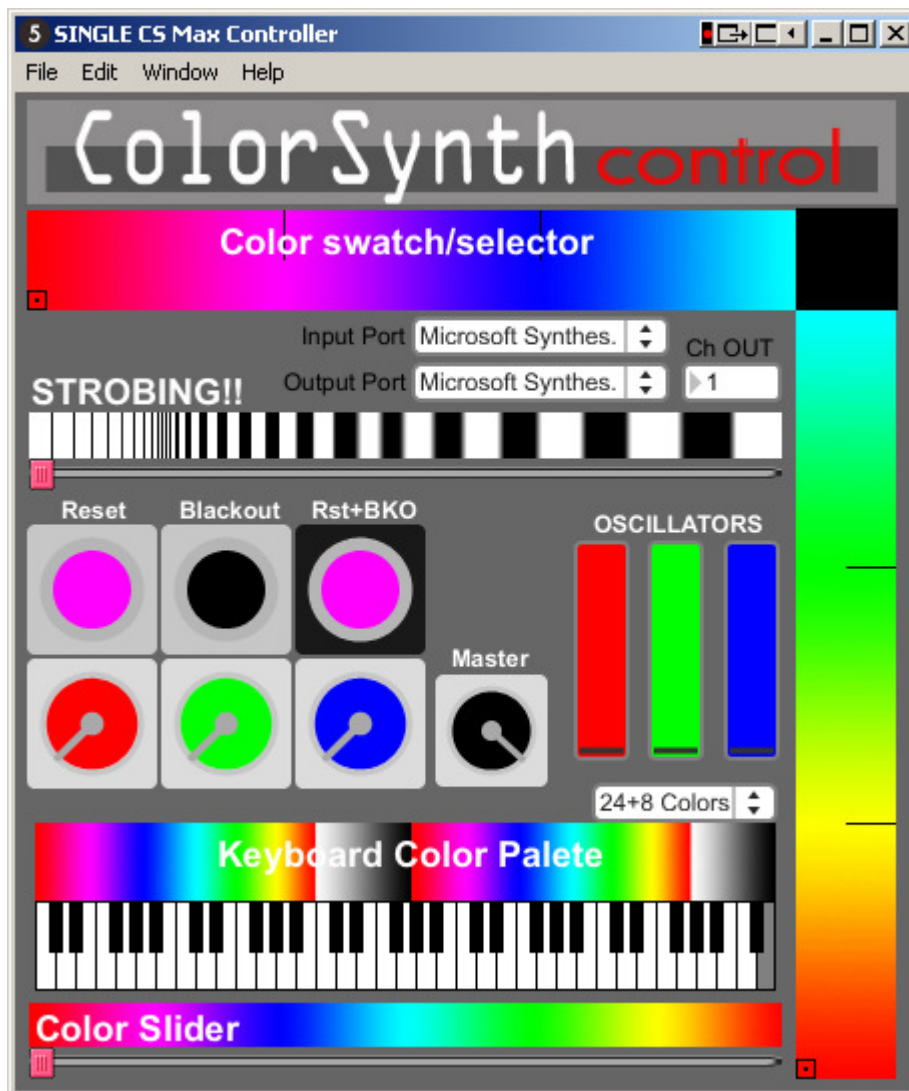
MIDI Channel Eavesdropping (MCE) – With a good interface, a MIDI connection can handle approximately 1,000 events per second. If you were to program 8 solid continuous controller ramps from 0 – 127 all within one second, you would exceed the max limits of the MIDI protocol. This is the main reason why MIDI is not used in theatrical and commercial stage lighting. Our workaround for this limitation is MCE. If you have several ColorSynths all chained on a single MIDI cable, you might want some of your fixtures to be synchronized for part of the performance. Rather than duplicate the data, you can tell a ColorSynth to temporarily listen to another channel. Each ColorSynth will listen to CC25 events sent on it's DIP Switch assigned channel. A value of 0 resets the ColorSynth so that it listens to it's own channel. Otherwise, values 1-16 (and 17-32, repeating) will tell a ColorSynth to listen to the corresponding channel.

Blackout – Sets RGB values to 0, turning the fixture dark.

Reset – Sets all oscillators, strobing, eavesdropping etc to default

Reset and Blackout – Both of the above, in a single command.

ColorSynth Control MAX/MSP Patch



The ColorSynth Control MAX/MSP patch is available for free. It can be downloaded at:
<http://www.colorsynth.com/maxpatch/>

To use it you will need the FREE MAX/MSP runtime environment, available at:
<http://www.cycling74.com/downloads/max5>

You can incorporate this patch into your DAW software via virtual MIDI cables, such as:
<http://www.midiox.com/>

Please contact eric@colorsynth.com if you need help using this control software.

WARRANTY AND DISCLAIMER

ColorSynths are HAND BUILT in Oakland, CA by Eric Bateman, who also dreamed of, created, and designed them (with a good amount of help from his friends).

ColorSynths are not mass produced and they should not be treated as such. At the risk of being presumptuous, we would like you to consider them as hand crafted pieces of electronic artwork. As such we would like to offer a higher level of support and interaction to you.

If you experience any problems with your ColorSynth, please feel free to contact us. We promise to support and repair your ColorSynth for as long as we are able. The warranty is neither lifetime nor limited, it is simply a commitment to help you enjoy your ColorSynth and the blinky, frothy colors that it sprays across you and your audience, for as long as we can.

Eric Bateman can be easily contacted by sending an email to eric@colorsynth.com. If you are experiencing a crisis, related to the ColorSynth or not, please give Eric a restrained yet earnest call at 510-910-0498, and if available he will be glad to listen and offer his therapeutic and hopefully cathartic advice.

Yes that is his cellphone. Please use it sparingly.

You can also visit www.colorsynth.com for all of the latest updates and support.