Medusa DMX Manual

The Medusa DMX is a 24-channel DMX controlled prop interface. It decodes DMX-512 data, and controls servos, LEDs, and switch outputs, allowing for remote animated control of props.

To control devices, you will also need will need a power supply and a source of DMX data (lighting control console, or a computer with a DMX adapter)

Features

- (8) Switch closure outputs
- (8) Servo outputs, 90° or 180°
- (8) No flicker LED outputs
- Configurable DMX start address (1 to 512)
- Selectable termination resistor

Specifications

Board

Supply voltage:	6Vdc to 12Vdc
Supply current:	100 mA
Dimensions (W x L)	2.620” x 2.480”
Hole centers (W x L)	2.125” x 1.875”

Switch closure outputs

Max voltage:	50V
Max sink current:	500mA (one channel) 150mA (multiple channels)

Servo

Refresh rate	50Hz
Pulse range	
90° range mode	1000µS to 2000µS
180° range mode	600µS to 2400µS

LED outputs

Max voltage:	50V
Max sink current:	500mA (one channel) 150mA (multiple channels)

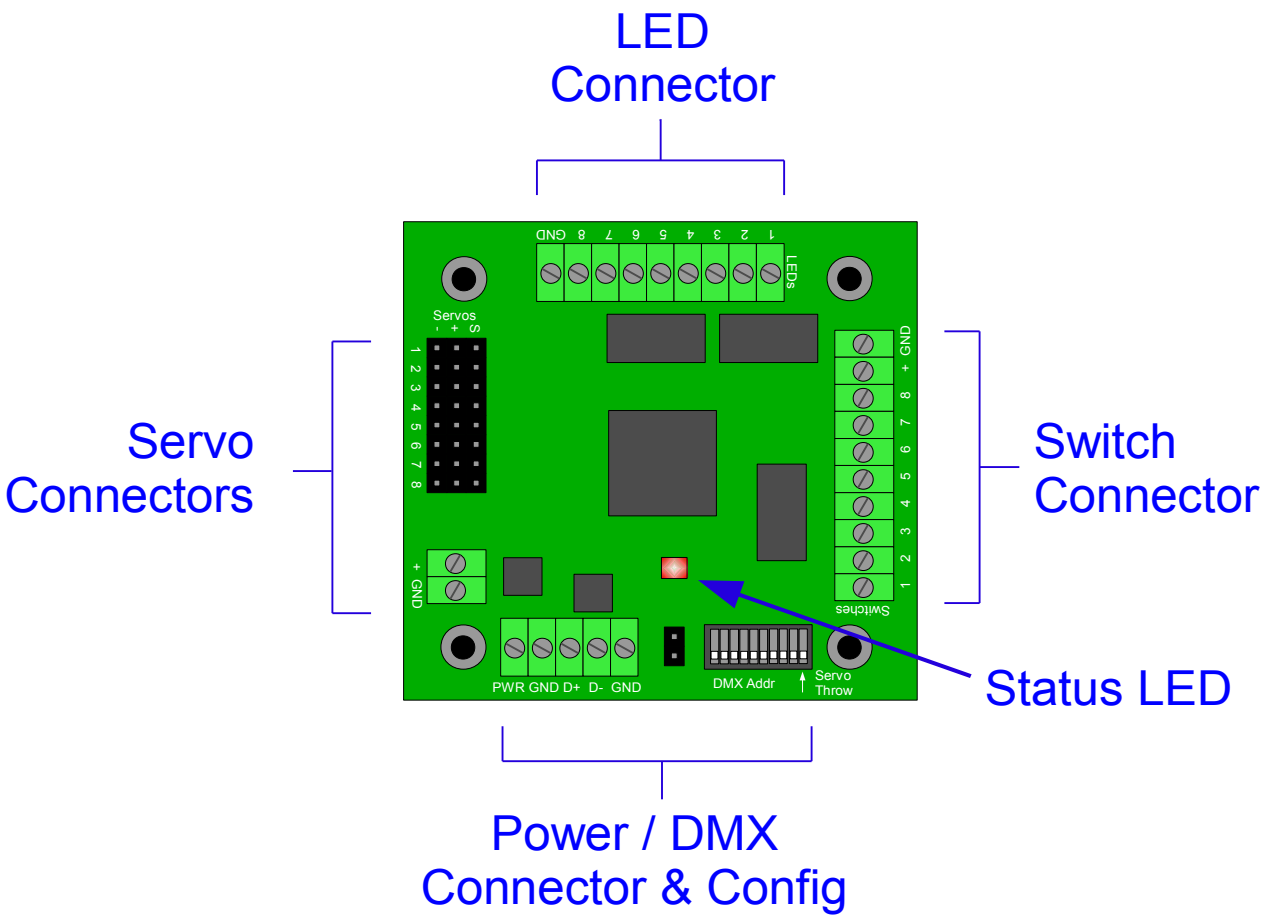

Figure 1 – Connection layout

To get your Medusa DMX controlling your props, we're going to go from one side to the next, making connections. We'll start with connecting power and a source of DMX data to the board. This will get us far enough to test your power supply, and get a first sign of life from your new project. After this, we'll move on to the switch output connector, to connect any relays or low-current devices you may have. Then we'll move on to the LED connections, to get your project lit up. And for the final connections, we'll connect up the servos, and their power, to really get your creation moving!

Medusa DMX Power
First, you'll need to connect a DC power source for the Medusa DMX. This can be from a wall transformer or battery pack, or any other type of regulated DC supply. The supply can be 6vdc to 12vdc, and should be capable of supplying at least 100 mA of current. When choosing a power supply, keep in mind that all ground (aka: GND, minus) connections on the board are connected together. Once you've chosen your supply, and prepped the wires, make the connection as shown in *Figure 2*.

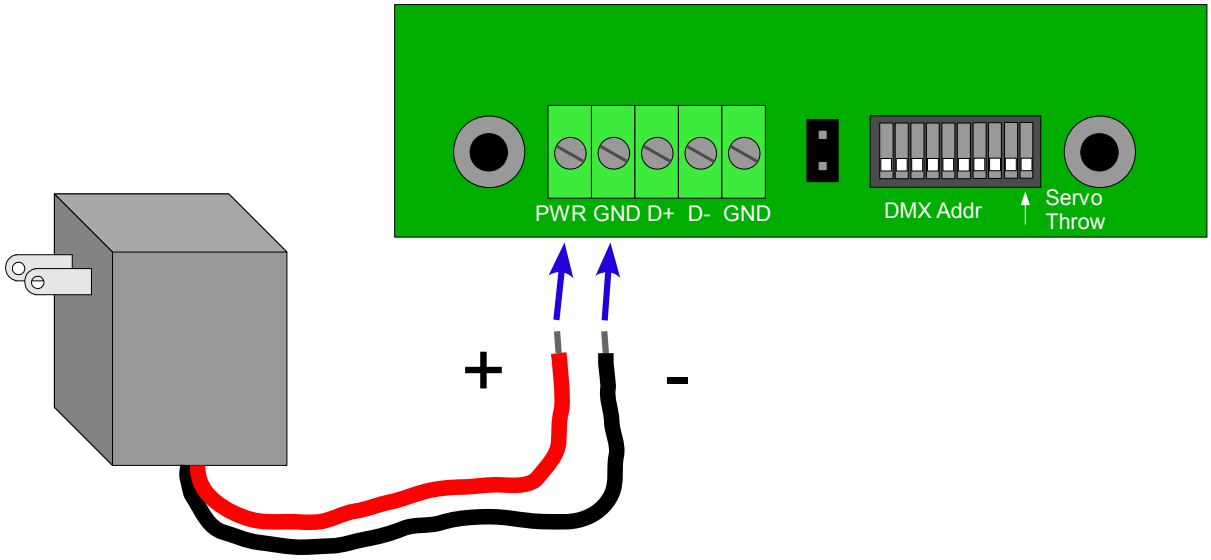

Figure 2 – Medusa DMX power connection

Now that you've connected the power, you can get an early sign of life by powering up the board! Just turn on your Medusa DMX power supply, and you should see the status LED light up with a solid glow. If the LED doesn't light up, turn off the power immediately, and check your supply and wiring. If the supply is connected incorrectly, damage can occur to either the Medusa DMX board, the power supply, or both.

DMX Data
DMX is a serial data link, similar to the serial port of a computer. However, unlike serial ports, DMX uses differential wiring. This means DMX streams the data over two wires simultaneously. One wire streams the data (D+), and the other wire streams the *opposite* of the data (D-). This wiring scheme allows DMX to control devices over much longer distances, with fewer problems from electrical noise.

It's important to get D+ and D- to their proper location on the Medusa DMX, and other DMX devices. If these two are swapped, the DMX data will be garbled, and the Medusa DMX (or other DMX device) won't work. The table below shows the *Standard* 5-pin XLR pinout, and two known pinouts for a 3-pin XLR. Note, that since the 3-pin XLR is non-standard, you may find devices with different pinouts.

	5-Pin	3-Pin	3-Pin
	The Standard	Velleman K086, Chauvet	
1	GND	GND	GND
2	Data 1 -	Data -	Data +
3	Data 1 +	Data +	Data -
4	Data 2 -		
5	Data 2 +		

Table 1 – DMX XLR pinouts

Once you've determined the pin order for your DMX master, connect the DMX data from the master to the Medusa DMX as shown in *Figure 3.*

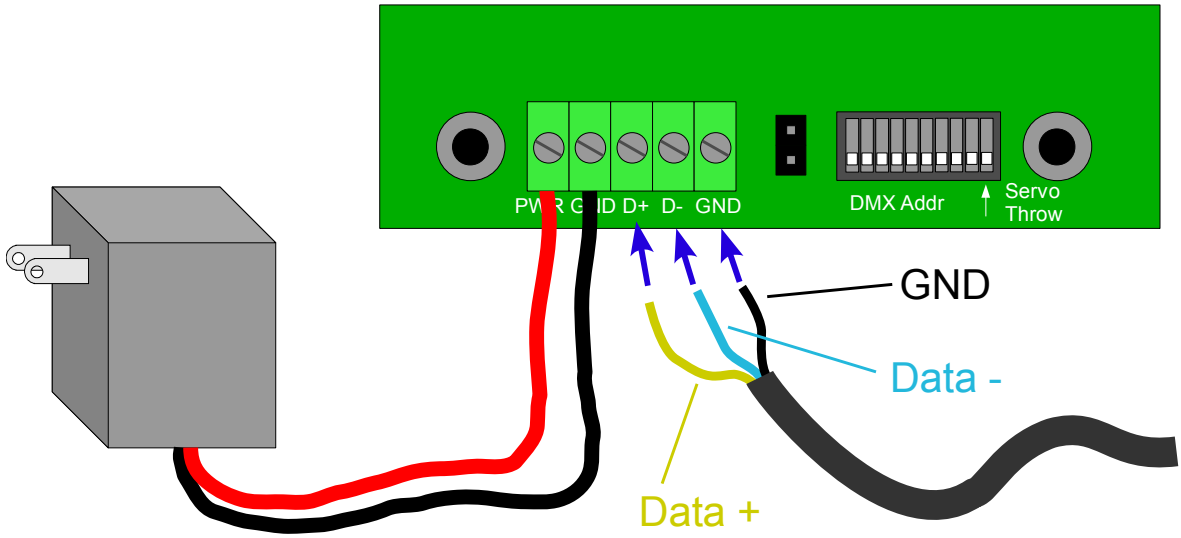

Figure 3 – DMX data connection

Termination

Depending on your setup, you may or may not wish to connect the on-board termination resistor. Terminations are useful when there are multiple DMX devices connected through long wires. If the data line isn't properly terminated, it's possible for the signals to 'bounce' at the end of the wires, and send a reflection back through the lines. If this happens, some of the DMX devices may receive garbled data.

Install the termination jumper if...
The Medusa DMX is either the only slave device on the DMX lines, or it is the last slave device on the DMX lines.

Remove the termination jumper if...
There are more than one slave device on the DMX lines, but the Medusa DMX is *not* the last device on the lines.

Determine which DMX topology fits, and install or remove the termination jumper according to *Figure 4*.

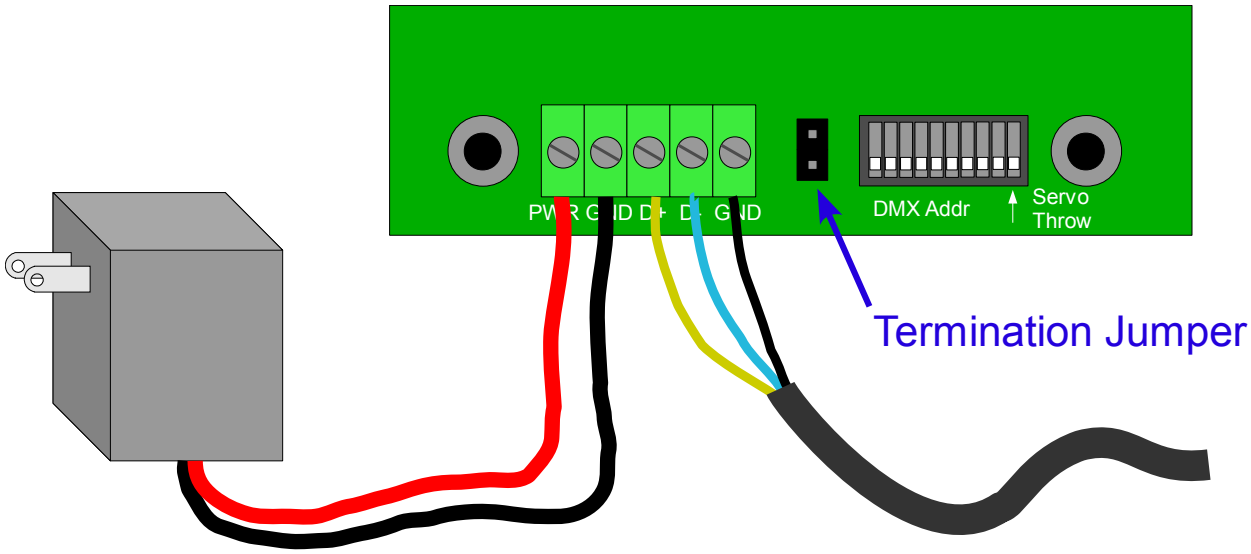

Figure 4 – Termination Jumper

DMX Addressing

There are up to 512 channels of information in a DMX 'universe'. Each channel is comprised of one byte of information that can control a function in a DMX slave device (e.g.: a servo position, or an LED brightness). DMX slave devices have switches to set their 'start address'. This switch setting dictates which channel the slave should get its *first* channel data from.

In order to determine the addressing settings you need, first figure out what you want your start address to be, from *Table 2*, below. Your DMX master software or hardware may partially dictate this.

Switch output	**Channel**	**Servo output**	**Channel**	**LED output**	**Channel**
Switch 1	*Start*	Servo 1	*Start + 8*	LED 1	*Start + 16*
Switch 2	*Start + 1*	Servo 2	*Start + 9*	LED 2	*Start + 17*
Switch 3	*Start + 2*	Servo 3	*Start + 10*	LED 3	*Start + 18*
Switch 4	*Start + 3*	Servo 4	*Start + 11*	LED 4	*Start + 19*
Switch 5	*Start + 4*	Servo 5	*Start + 12*	LED 5	*Start + 20*
Switch 6	*Start + 5*	Servo 6	*Start + 13*	LED 6	*Start + 21*
Switch 7	*Start + 6*	Servo 7	*Start + 14*	LED 7	*Start + 22*
Switch 8	*Start + 7*	Servo 8	*Start + 15*	LED 8	*Start + 23*

Table 2 – Medusa DMX device addresses

Once you've decided on a start address, locate the DMX start address switches, as seen in *Figure 5.*

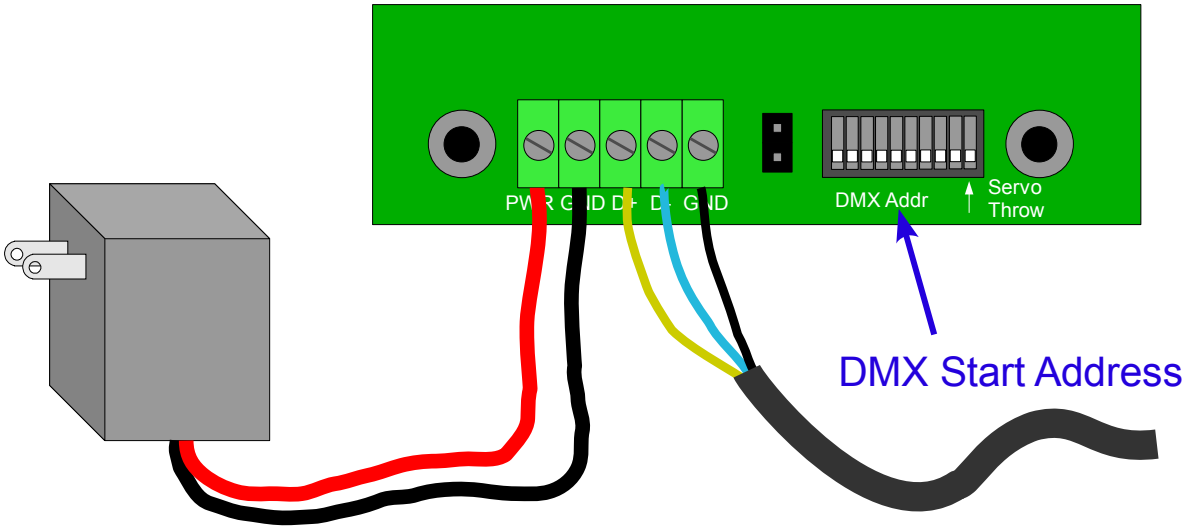

Figure 5 – DMX start address switches (1-9)

Then, set the start address, using switches 1-9, according to the table in Appendix A. This is in binary coding, with switch #1 as the least-significant bit.

Power-up Test
At this point, you can apply power, and send DMX data to the Medusa DMX, to verify everything is working properly thus far.

First, turn on the power to the board. The status LED (see *Figure 1*) should light solid red. If it doesn't, check your power wiring.

Once the power has been applied, turn on the DMX master, and send DMX data to the Medusa DMX. This should cause the status LED to flash between red and green. The faster the DMX data, the faster the status LED will toggle between red and green. If the data is very fast (or is set up to send a very small universe), the status LED may appear yellow (because the flash rate is so high). If the status LED fails to flash, check the DMX wiring, and the DMX master.

After power has been verified, turn off the Medusa DMX power, and proceed to hook up the devices you want to control.

Connecting Switch Outputs
The Medusa DMX can control up to (8) relays, solenoids, solenoid valves, motors, or other DC switchable device. Each device must draw less than 150mA of current, when switched on. If only one device is used, this device may use up to 500mA of current when switched on.

Depending on the DMX channel data for the respective switch, the output will be active (ON) or inactive (OFF)

DMX channel data is '1' or greater
The switch output is active (ON), and will be connected to GND

DMX channel data is '0'
The switch output is inactive (OFF), and will be 'open-circuit' (i.e.: disconnected)

Since the Medusa DMX switch outputs only connect to GND, the devices to be turned on/off need to be connected to the positive side of the supply. Refer to *Figure 6* for how to wire the switch outputs.

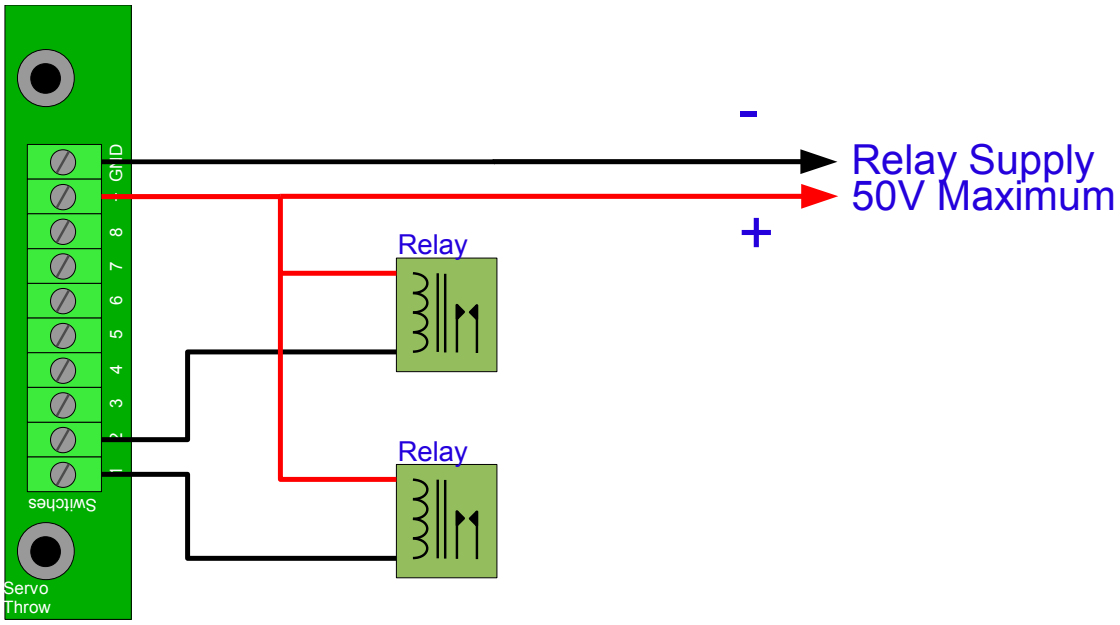

Figure 6 – Switch Outputs

Although relays are shown here, other devices can be connected in the same manner. Relays, solenoids, solenoid valves, LEDs, etc, can all be connected, as long as the current and voltage are within the provided limits.

Special Note:
Although it may seem the connection between the '+' terminal and the positive side of the supply isn't necessary, it is for protection of the Medusa DMX board. This must be connected if any type of inductive load (anything with a coil) is connected. This is to protect against 'inductive kick'.

Connecting LED Outputs
LEDs are wired up in a manner similar to the switch outputs. At each LED output, multiple LEDs can be wired in series (end to end) in order to get higher light output. As with the switch outputs, the maximum current allowed for the LED outputs is 150mA each (for multiple outputs) or 500mA (if only one output is used). Refer to *Figure 7* for how to wire up LEDs to the Medusa DMX.

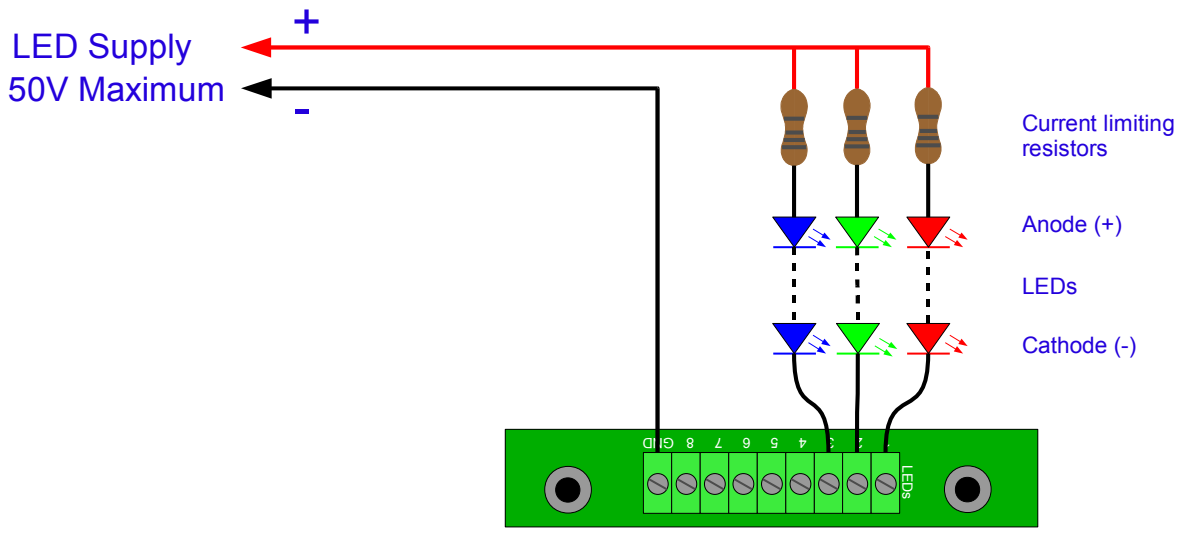

Figure 7 – LED outputs

If you're using standard 3mm, 5mm, or 10mm LEDs, the Cathode (-) connection is usually on the side with the flat spot. Connect the Cathode side to the Medusa DMX LED output connector.

In order to determine the right value for the current limiting resistor, use the following formula.

R *(kohms)* = (supply_voltage – led_forward_voltage) / desired_current *(in mA)*

Or, even better... type 'LED resistor calculator' into your favorite internet search engine. There are many very good automatic calculators available on the internet.

Servo Outputs

Finally, the servos. We've saved the simplest for last! First, you'll need a servo power supply. Most servos will accept between 4.8v and 6v. The amount of current you'll need the supply to deliver will depend on how much load the servos in your creation will be subjected to.

> *Special Note:*
> *Although the Medusa DMX can be powered by as little as 6v, using the same supply for both the Medusa DMX and the servos is not recommended! When under load, servos draw significant current, and will pull down the voltage of the supply. Unless you have a high-current, regulated supply, the servos and the Medusa DMX should be powered from different power supplies.*

Once you have selected your servo supply, connect it to the Medusa DMX as shown in *Figure 8*.

Next, we'll hook up the servos. As shown in *Figure 8*, below, servos have 3 connections: -, +, and Signal. It's important to get these connections right. Otherwise, you may damage your servos. Depending on what brand of servos you're using, you may need to rewire the servo connectors in order to get the connections in the right order. Consult the servo's documentation, and then make the connections as shown below, in *Figure 8*.

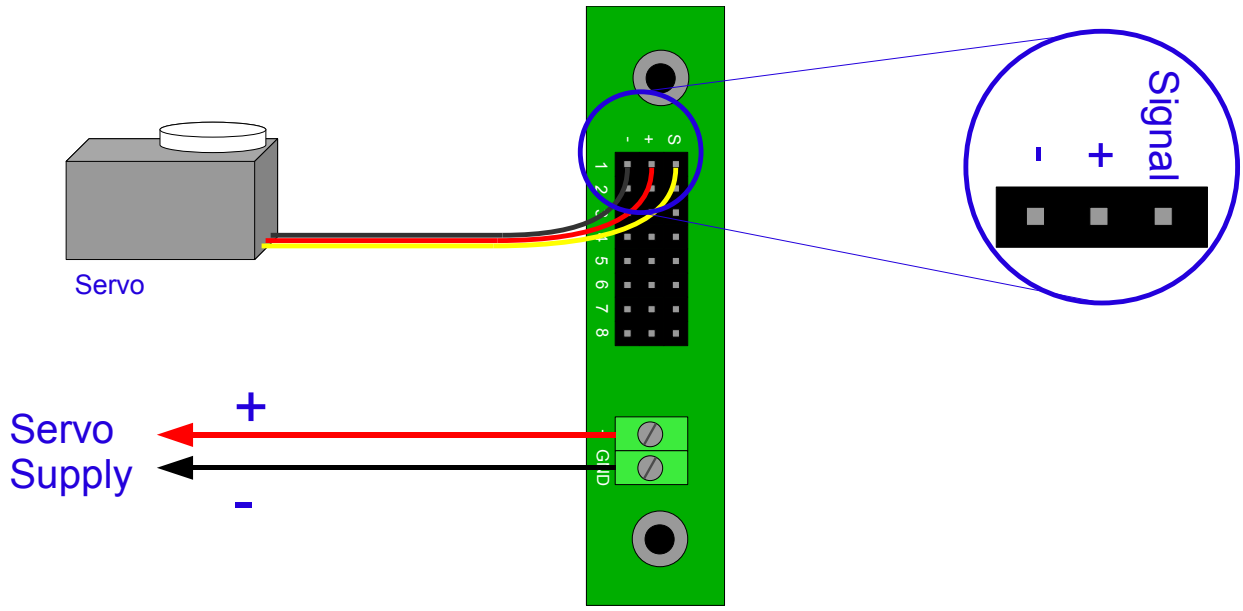

Figure 8 – Servo Outputs

That's It!
Your creation is now ready to rock 'n roll! Time to start animating!!!

Appendix A

Setting of DMX start address switches

Below are several tables showing how to set the DMX start address switches (switches 1-9). Find the desired start address along the left side of the columns. Then set the switches according to the white or black squares representing each switch. If the square is black, the switch is 'OFF'. If the square is white, then it's 'ON'.

Required Switch Settings

DMX Start Address	1	2	3	4	5	6	7	8	9
1	■	■	■	■	■	■	■	■	■
2	□	■	■	■	■	■	■	■	■
3	■	□	■	■	■	■	■	■	■
4	□	□	■	■	■	■	■	■	■
5	■	■	□	■	■	■	■	■	■
6	□	■	□	■	■	■	■	■	■
7	■	□	□	■	■	■	■	■	■
8	□	□	□	■	■	■	■	■	■
9	■	■	■	□	■	■	■	■	■
10	□	■	■	□	■	■	■	■	■
11	■	□	■	□	■	■	■	■	■
12	□	□	■	□	■	■	■	■	■
13	■	■	□	□	■	■	■	■	■
14	□	■	□	□	■	■	■	■	■
15	■	□	□	□	■	■	■	■	■
16	□	□	□	□	■	■	■	■	■
17	■	■	■	■	□	■	■	■	■
18	□	■	■	■	□	■	■	■	■
19	■	□	■	■	□	■	■	■	■
20	□	□	■	■	□	■	■	■	■
21	■	■	□	■	□	■	■	■	■
22	□	■	□	■	□	■	■	■	■
23	■	□	□	■	□	■	■	■	■
24	□	□	□	■	□	■	■	■	■
25	■	■	■	□	□	■	■	■	■
26	□	■	■	□	□	■	■	■	■
27	■	□	■	□	□	■	■	■	■
28	□	□	■	□	□	■	■	■	■
29	■	■	□	□	□	■	■	■	■
30	□	■	□	□	□	■	■	■	■
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38	□	■	□	■	■	□	■	■	■
39	■	□	□	■	■	□	■	■	■
40	□	□	□	■	■	□	■	■	■
41	■	■	■	□	■	□	■	■	■
42	□	■	■	□	■	□	■	■	■
43	■	□	■	□	■	□	■	■	■
44	□	□	■	□	■	□	■	■	■
45	■	■	□	□	■	□	■	■	■
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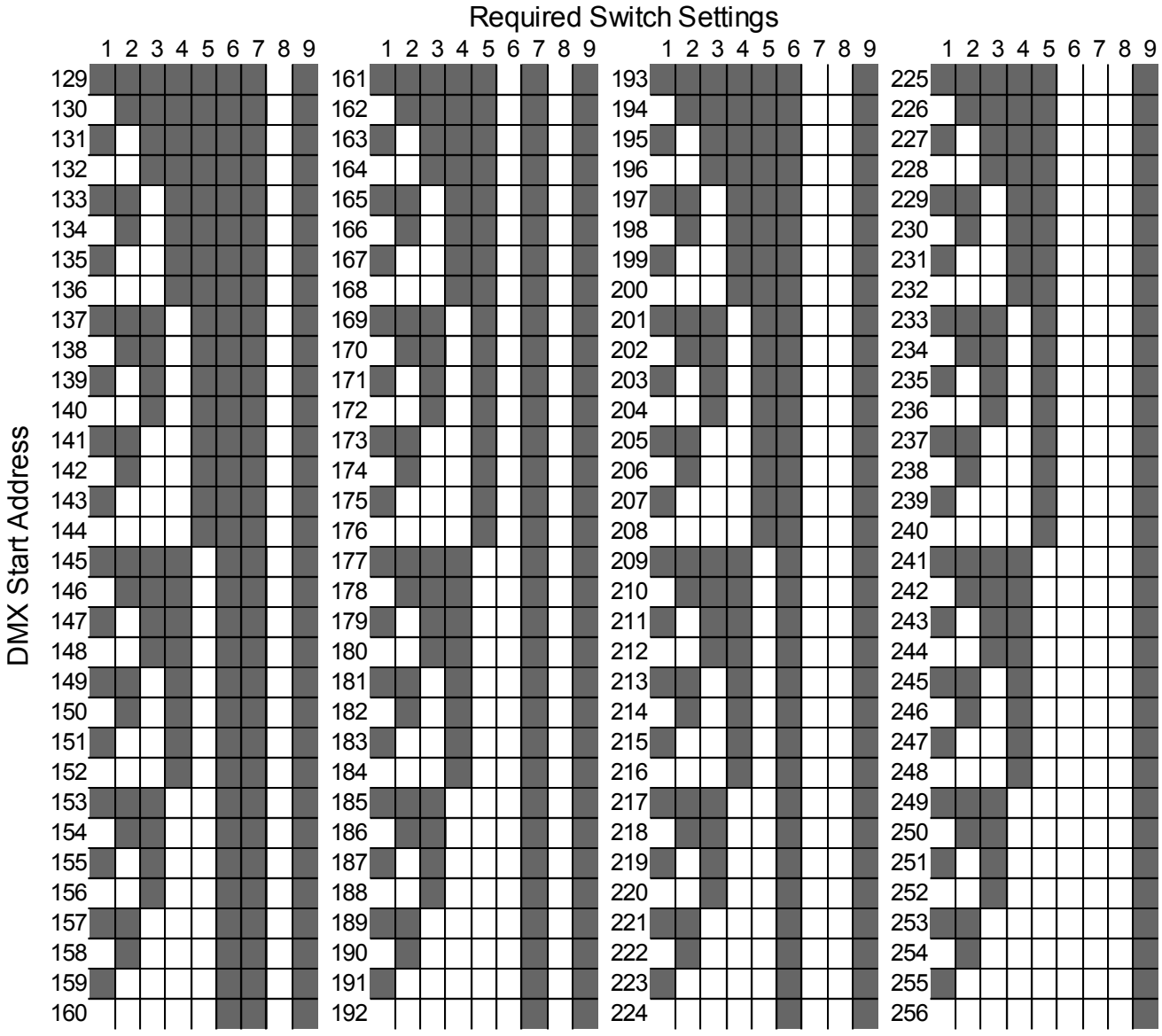
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1 2 3 4 5 6 7 8 9
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161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192
193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224
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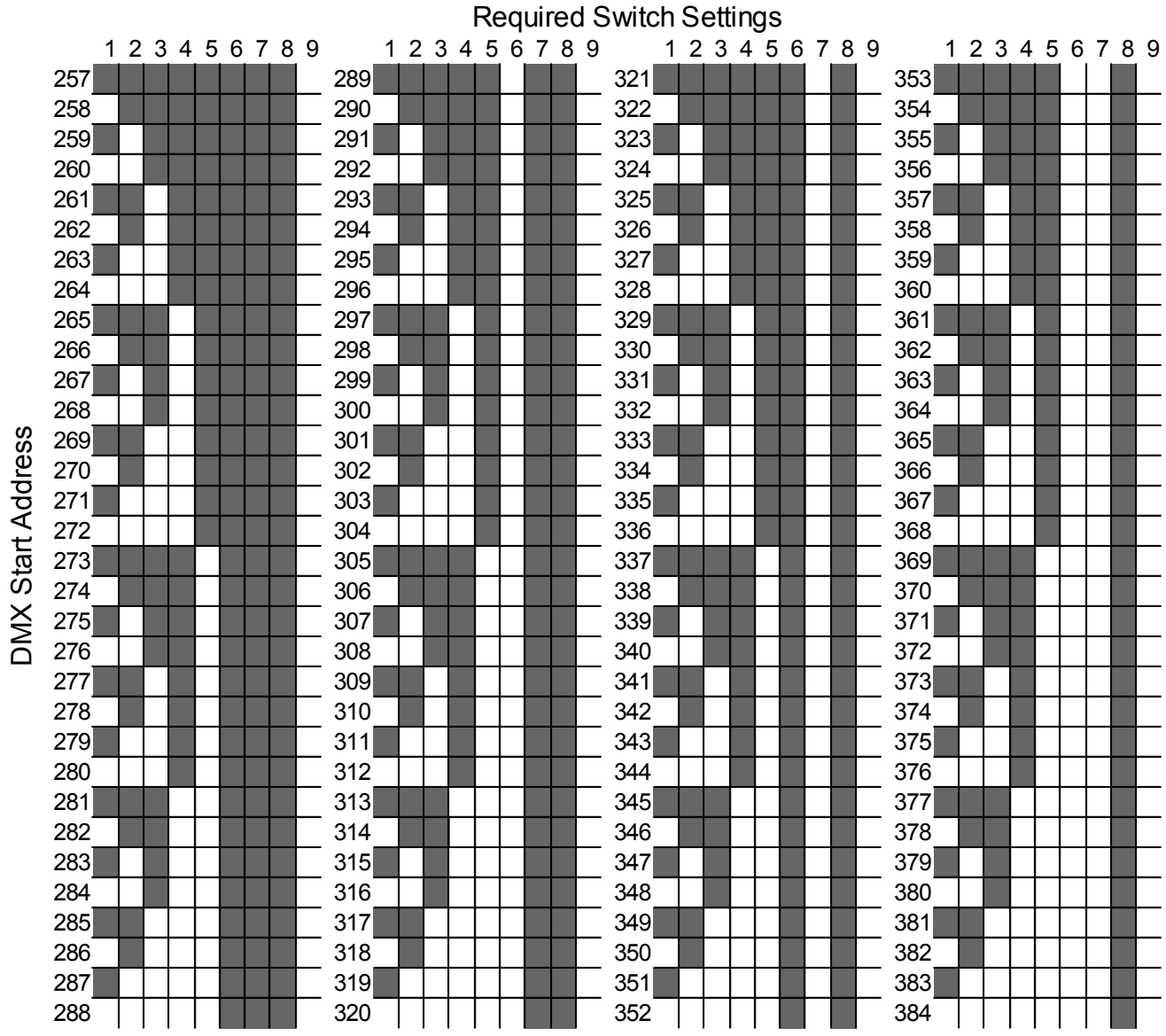
Required Switch Settings
DMX Start Address
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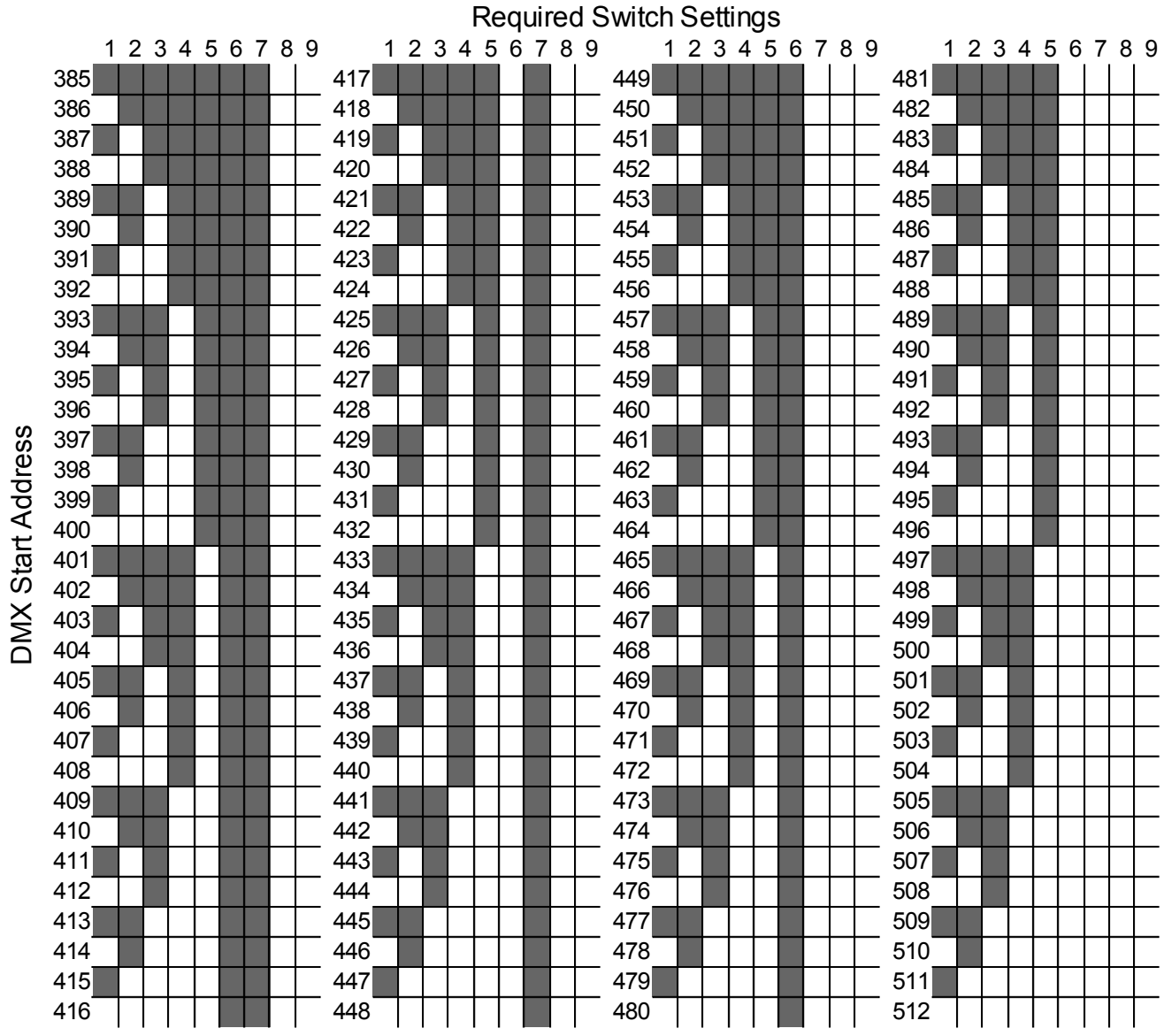
Required Switch Settings
DMX Start Address
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