



Digital Media Extension (DMX512) Controller
for Controlling Light Dimmers and Other Devices

SAFETY DISCLAIMER

Any electronic or mechanical system has a potential to fail. Certain applications using Animated Lighting, L.C. equipment may involve potential risks of death, personal injury or server property or environmental damage (“Critical Application”).

Animated Lighting, L.C. equipment is not designed, intended, authorized or warranted to be suitable in life support applications, devices or systems or other critical applications. Inclusion of Animated Lighting, L.C. products in such applications is understood to be fully at the risk of the customer. In order to minimize risks associated with the customer’s applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazards.

Animated Lighting, L.C. assumes no liability for applications assistance, customer produced design, software performance, or infringement of patents or copyrights. Nor does Animated Lighting, L.C. warrant or represent that any license, either expressed or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of Animated Lighting, L.C. covering or relating to any combination, machine or process in which Animated Lighting, L.C. products or services might be or are used.

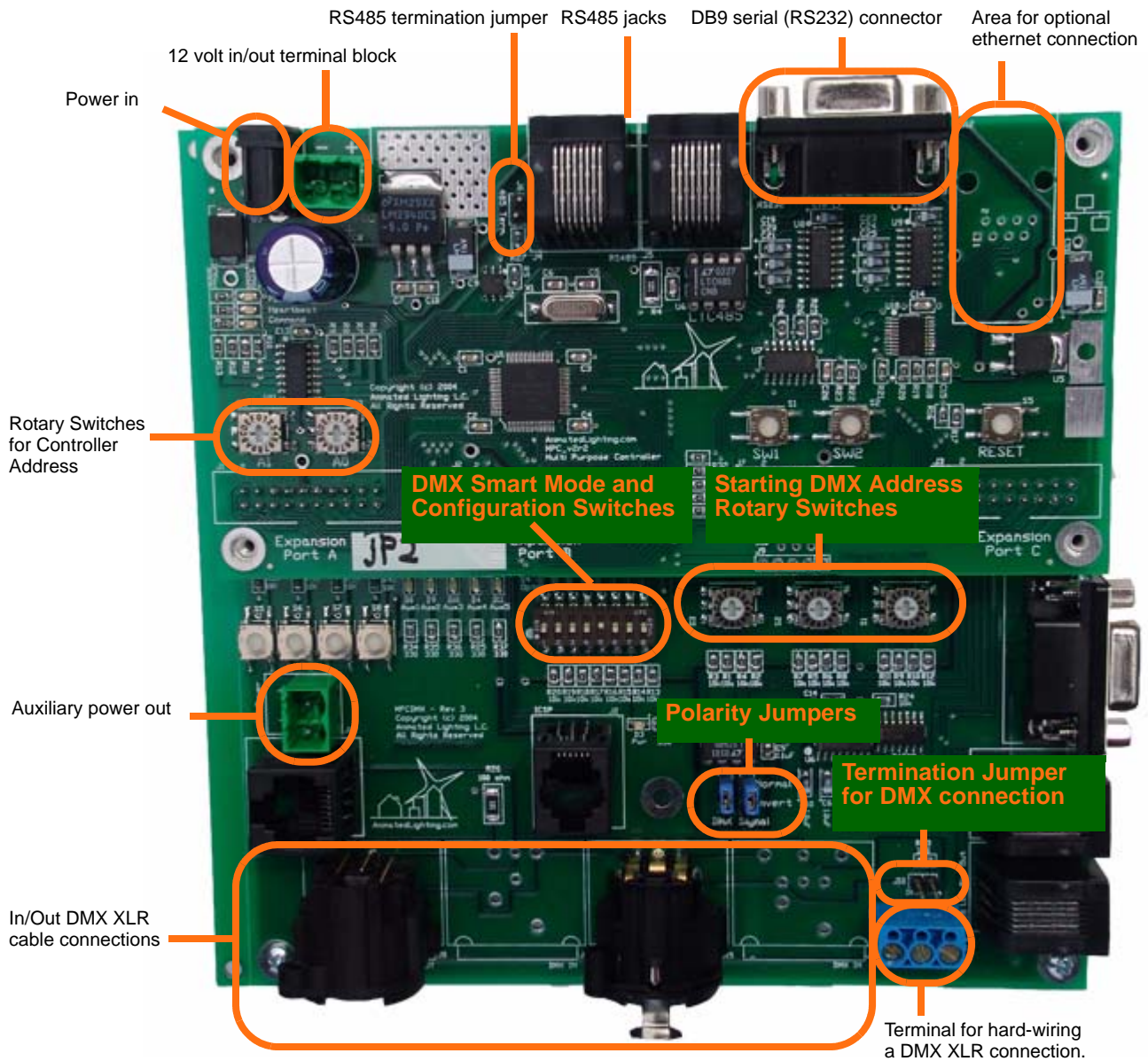
**Copyright © 2004 Animated Lighting L.C.
www.animatedlighting.com**



All rights reserved

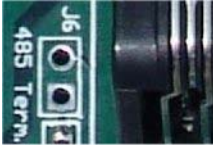





This publication, or parts thereof, may not be reproduced in any form, by any method, for any purpose without expressed permission from Animated Lighting L.C.


Third party credits: ©1985-2004 Microsoft Corporation. All rights reserved.

DMX Controller Connections



Board Component	Description
	<p>Power-In - Power is typically supplied by a 12 volt wall power brick such as Animated Lighting's AC-ADP. This input is protected from reverse polarity connections.</p>
	<p>12 Volts Out/In – This terminal block can be used to power other low current 12 volt devices, eliminating multiple power bricks. This output is limited to 500 milliamps or less. This output is not regulated and comes directly from the Power-In connector through a diode.</p> <p>This terminal block may also be used to power the board from another 12 volt source.</p>

Board Component	Description
	<p>RS485 – There are two RJ45 jacks for connecting the MP3 Controller to a Monster Brain and other controllers. All controllers are connected in a daisy-chain. Both connectors are identical so you can use either one. Standard data network cabling can be used to connect the controllers. These cables are available from your local electronics store, most large hardware stores such as Home Depot® or Lowes®, or Animated Lighting™.</p>
	<p>RS485 Termination Jumper - There is a termination jumper for the RS485 connection. In small setups or short cable runs this jumper usually doesn't need to be installed. On longer runs, this jumper should be installed on the first and last boards in the daisy chain of Animated Lighting controllers.</p>
	<p>DMX Device Connectors - Two sets of in/out DMX connectors are provided. One set for 3-pin XLR cables and another set for standard 5-pin XLR cables. Although the 3-pin cable is an older style, the pin outs on this cable work the same as the first three pin outs on the 5-pin cable.</p>
	<p>Ethernet – If the optional Ethernet connector is installed, you can connect this board to a data network. This will allow you to control the board remotely over the network. See the separate documentation concerning Ethernet connections.</p>
	<p>DB9 Serial Connectors – There are two DB9 serial connectors available for future options. One is located on the top of the board between the RS485 connectors and the Ethernet connector. The other is located on the lower board.</p>
	<p>Aux 12V Power Out – It can be used to power auxiliary devices. It gets its power from the Power In connector.</p>
	<p>DMX Termination Jumper – DMX is a high speed protocol and is sensitive to line lengths. It is recommended that you terminate both ends of the DMX line with 120 ohm resistors. Position a jumper over these pins to terminate the controller end of the line, then install another terminator at the other end of the DMX line.</p>

Board Component	Description
	<p>DMX Polarity Jumper – Some DMX fixtures have their connections reversed, so we've provided a polarity jumper. Normally, these two jumpers should be over the "Normal" pins. If your DMX fixtures require reverse polarity, place the jumpers over the "Invert" pins.</p>

DMX Controller Indicator LEDs

There are three indicator LEDs on the controller. They are near the power connector.



Power - lights constantly if the controller is powered.

Heartbeat - blinks continuously when the controller is operating properly.

Command - lights whenever the controller is receiving valid data.

If the controller senses that its program has been corrupted, it reverts to the bootloader state and the red heartbeat LED will light continuously (not blink). This means the program on the controller has been corrupted and new firmware needs to be installed. This is easily done using the Animation Director software. For more information about updating firmware, see *Appendix F: Firmware Updates*.

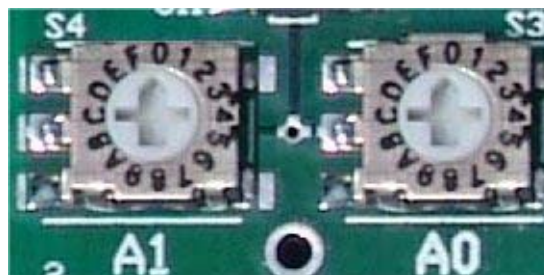
Testing the Lights and Resetting the Controller

To test the lights in your DMX universe, plug the DMX cable into the appropriate connections and press the SW1 button on the DMX controller. Each light is turned on, one at a time. Press the Reset button to reset the onboard microprocessor. Press this button if the controller address has changed, or the board appears to be "frozen." In general, you should rarely need to press this button.

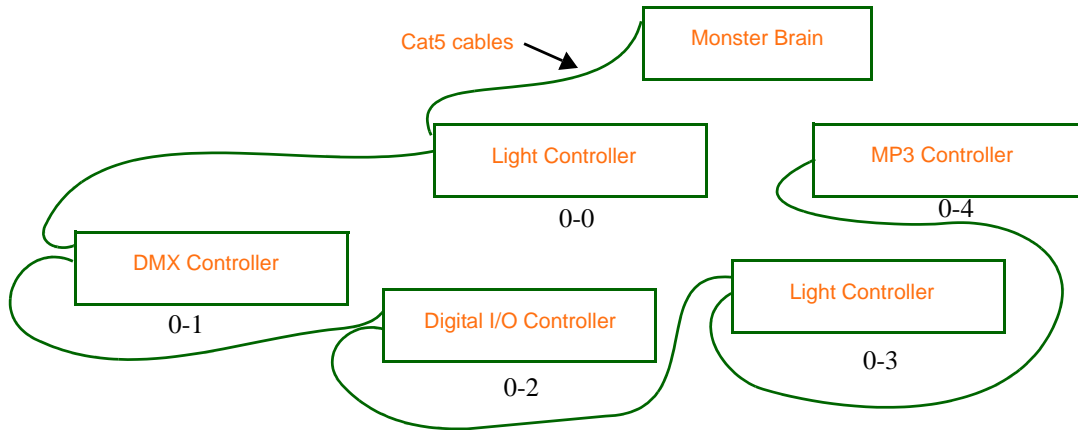


Setting the DMX Controller Address

Each controller in the system must have a unique address to differentiate one controller from another and for Animation Director to know what commands to send to which controller. The address is set using the two rotary address switches on the controller. There are 16 positions on each switch, where the combinations allow a possible 256 addresses ($16 * 16$).



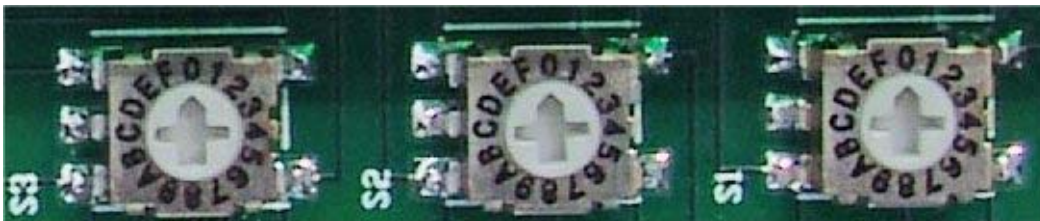
Connect the controllers in order and don't skip address numbers. For example, the controller nearest Monster Brain should be set at 00, the second out at 01, the third out at 02, etc. See *Appendix A: Setting Board Addresses* for a list of address settings.



Setting the Starting DMX Address

The DMX Starting Address rotary switches determine how the DMX channels map to Animated Lighting light addresses designated for this controller. If the DMX address is set to 1 (i.e., 0, 0, 1), the first Animated Lighting channel on this controller will map to DMX address 1. The second Animated Lighting channel maps to DMX channel 2, etc.

If the starting DMX address is set to something other than 1, then the first DMX channel transmitted by the DMX controller maps to the first Animated Lighting channel on this controller. For example, if the starting DMX address is set to 123 (i.e., 1, 2, 3), the first Animated Lighting channel on this controller maps to DMX channel 123, the second Animated Lighting channel maps to DMX channel 124, etc. DMX channels 1 through 122 are not transmitted by the DMX controller.



Use a small screwdriver and rotate the switches to the desired starting DMX address. For example, if you want the starting address to be channel 1 in the DMX universe, turn the S3 switch to 0, the S2 switch to 0, and the S1 switch to 1.

Making Dumb DMX Smarter

The DMX Controller can operate in two modes. In Smart mode, the first 30 channels operate as Smart DMX channels, and the rest are dumb. In Dumb mode, no DMX channels run in Smart mode. Normally you will want to run in Smart mode since you get the additional functionality.

It is important to plan out your DMX addressing scheme especially if you're using Smart DMX. While it makes sense to use Smart DMX on light dimmers, it makes less sense to use it on a smoke machine where ramping or fading will just delay the time it takes for the machine to activate. Set the Ramp and Fade Rates to 0 for devices like this.

Similarly, on light fixtures that have motors that move the light, ramping and fading will slow its movement, and effects like Sparkle don't make much sense. If a fixture like this is part of the Smart DMX channels, make sure you set the Ramp Rate and Fade Rate to 0 to eliminate them.

There are many different kinds of DMX devices. Dimmer packs use one DMX channel per light. LED fixtures use three channels - one for Red, one for Green, and one for Blue. Using combinations of these three colors (and different intensities) can create 16 million colors. A single moving light can use 20 or more DMX channels per fixture for Dim level, X direction, Y direction, Color, Focus, and Gobo wheel.

Then there are DMX devices that are not lights at all, such as smoke machines and bubble machines. Even servo controllers can be a DMX device.

Configuring the DMX Controller

There is an 8-position dip switch that configures various controller options. Switches 1-3 specify the mode. Switches 4-6 specify how many DMX channels to output. Switches 7 and 8 are not used.



8-position dip switches for setting Dumb or Smart mode and for controlling channel outputs.



The Aux1 LED turns on when the controller is running in Smart mode. The other LEDs are reserved for future use.

Switch Settings			Mode	Description
1	2	3		
Off	Off	Off	Smart	The first 30 channels are treated as smart channels and emulate all the effects and characteristics of Animated Lighting's light controllers. The remaining DMX channels are still controllable, but treated as dumb channels.
On	Off	Off	Dumb	All DMX channels are treated as dumb channels. They can only be set to a brightness level between 0 and 255. No other effects are possible.
Any other combination of switches 1, 2, and 3				Not Used

Switches 4 – 6 specify how many DMX channels to output from this controller – which directly determines the refresh rate. The refresh rate is how many times per second each channel is sent. You want the fastest refresh rate possible when you are ramping and fading lights so the light change looks smooth.

If you are only running one or two DMX fixtures, there's no need to send all 512 channels. This just slows the refresh rate. You should output the minimum channels necessary. The table below shows the switch setting for each refresh rate.

Switch Setting			Channels Output	Refresh Rate
4	5	6		
Off	Off	Off	16	1560
On	Off	Off	24	1040
Off	On	Off	32	780
On	On	Off	64	390
Off	Off	On	96	260
On	Off	On	128	195
Off	On	On	256	95
On	On	On	512	45

Troubleshooting Guide and FAQ

Wire Requirements

DMX signals carry high-speed data and it's important to use the right type of wire. Use only wire that's made for DMX signals. You can also use CAT-5 wire for most DMX applications. Make sure you use one of the twisted pairs for the signal wires.

DMX Repeaters

The RS485 specification that the DMX protocol is built upon specifies a maximum of 32 devices. If you are going to use more than 32 devices then you need a repeater or hub. A repeater will strengthen the signal allowing you to add another 32 devices. You can use multiple repeaters if needed.

There are also hubs that will allow multiple branches from one DMX signal. Each branch can usually drive 32 DMX devices.

DMX Termination

Since DMX signals travel at such a high data rate (250,000 bits per second), the signal is easily corrupted by reflections on the wire. That is, as the signal reaches the end of the wire, part of it bounces back to interfere with new data. This can cause intermittent data corruption. The DMX specification requires a 120 ohm resistor at each end of the line to reduce these harmful reflections. There is one built onto the DMX Controller for one end of the line. You need to install another at the other end of the line after your fixtures.

Checklist if you have problems:

- Does the unit have power? Is the power LED lit?
- Is the heartbeat LED blinking to indicate proper operation? If it isn't try pressing and releasing the reset button.
- If the unit shows no response to Monster Brain commands, is the RS485 cable connected between the DMX controller and Monster Brain? Can you communicate with the Monster Brain or other Animated Lighting™ controllers?
- Are the DMX Polarity jumpers installed? Try inverting polarity if you know or suspect that your DMX fixture used inverted polarity. This is rare.

Technical Specification

Power: 12VDC from 2.1mm I.D., 5.5mm O.D. connector

Standard DMX 5-pin and 3-pin XLR connectors

Standalone or networked to other Animated Lighting controllers

Controls up to 512 DMX channels

Up to 30 channels can be Smart DMX channels

Multiple DMX controllers can be used to control multiple universes

User-definable starting DMX address

User-definable DMX channel count

Macros – up to 100 macros