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Warranty and Disclaimer

Warranty

Northlight Systems warrants this product against defects in materials and workmanship for a period of 1 year.

If there is a defect, we will repair or replace the product. We offer a full refund on the purchase price if returned in original condition in less than 30 days.

Return the product with a description of the problem. We will return your item or its replacement using the same shipping method used to ship the product originally.

Disclaimer of Liability

Northlight Systems is not responsible for any special, incidental, or consequential damages resulting for any breach of warranty, or any legal theory, including lost profits, downtime, goodwill, damage to or replacement of equipment or property, and any costs associated with the use of Northlight Systems products described herein.

Northlight Systems has a policy of continually improving our products as new technology becomes available. Northlight Systems reserves the right to make changes and improvements to the specifications of this equipment at any time without notice.

Northlight Systems has made every attempt to ensure that the information in this document is accurate and complete. Northlight Systems assumes no liability for any damages that result from the use of this manual or the equipment it documents. Northlight Systems reserves the right to make changes to this document at any time without notice.

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8 Channel, DMX to 0 – 10 volt, Decoder board

Allows DMX512 digital protocol to control analog devices that require a 0-10VDC control voltage.

Upgrade 0-10 volt analog dimmers, LED drivers or motor controllers with analog input. Outputs 255 discrete voltage levels. High quality screw terminals are provided.

SPECS

Input Signal: Northlight decoder board accepts DMX 512 1990 as specified by USITT. The decoder board can receive data at the full rate. The decoder is responsive to all 512 channels.

Output: Output is 8 channels @ 0-5 or 0 – 10 volts, 10 milliAmps/channel. The output voltage has 255 discrete levels.

Address selection : LCD display with 4 button keypad.

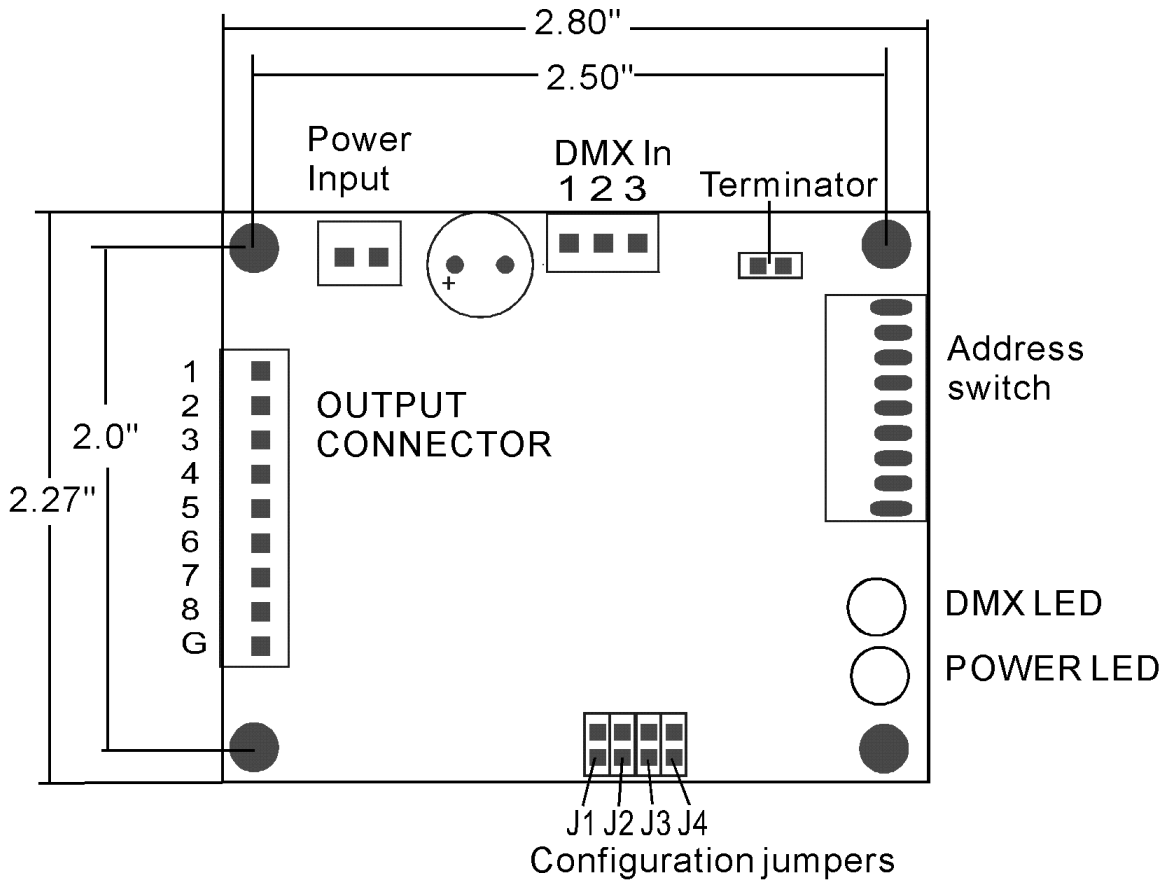
Power requirements: 14.5 to 18 volts AC or DC @ 250 mA average.

LED Indicators: Red power LED.
Green signal LED. Steady on indicates valid signal, flashing or dim indicates no signal or invalid signal.

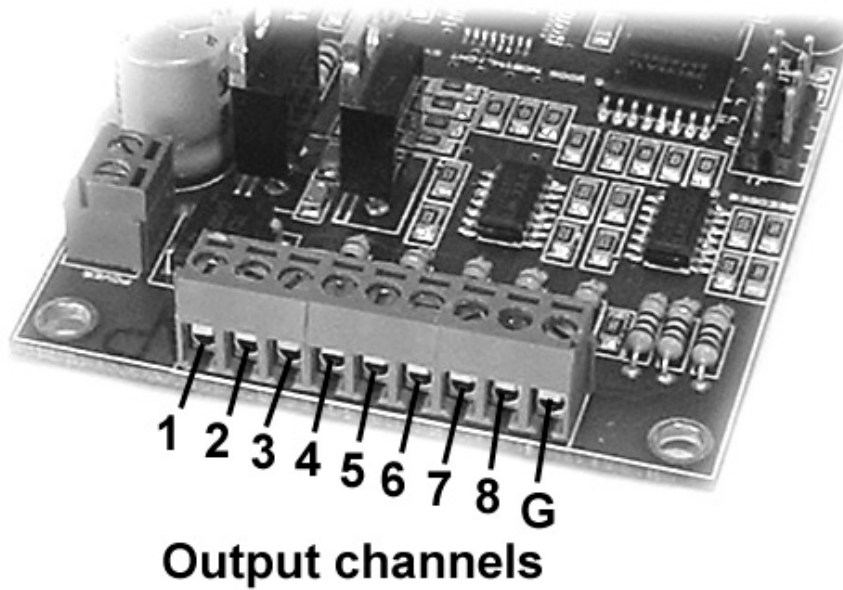
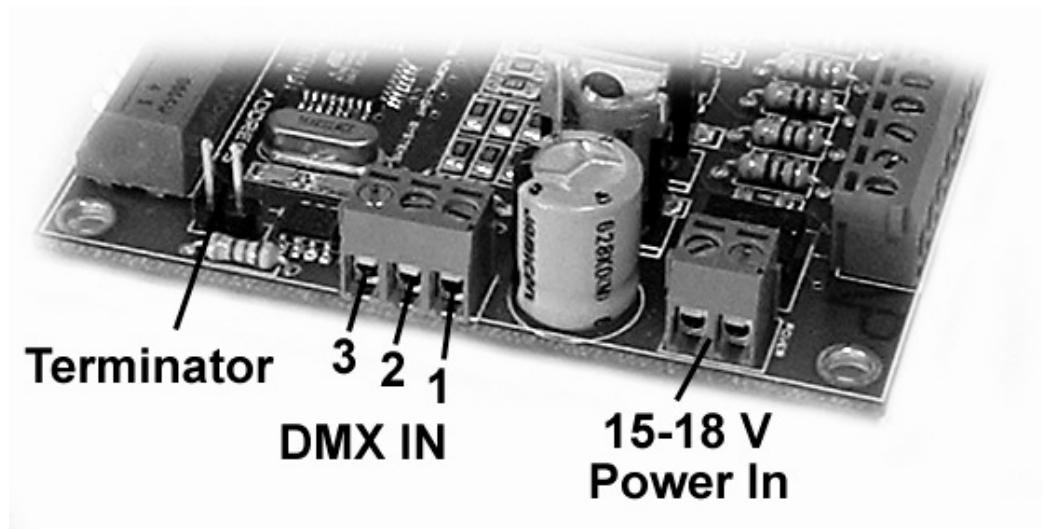
Board connections: All connections to the board are made via screw terminal blocks. Acceptable wire size is 18 – 26 AWG. See drawing for connector locations.

Physical Dimensions: 8 Channel board

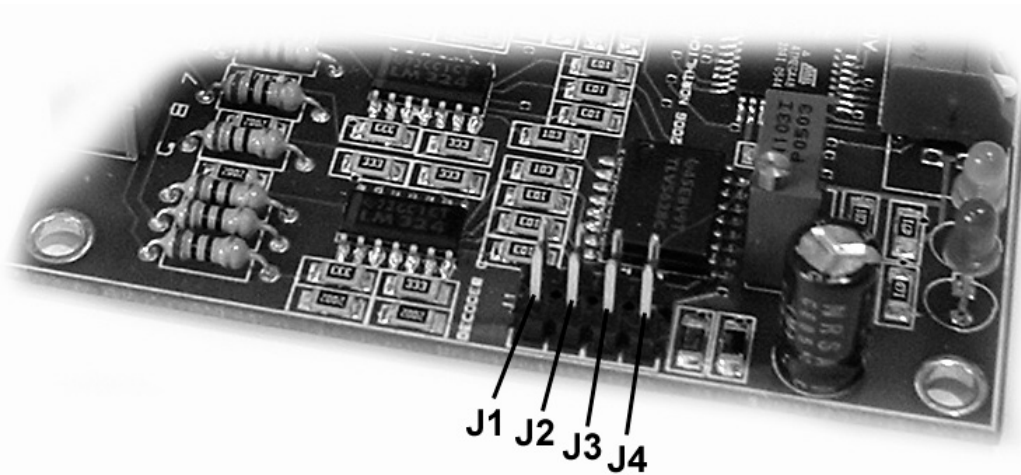
2.80" X 2.27" +/- .015"



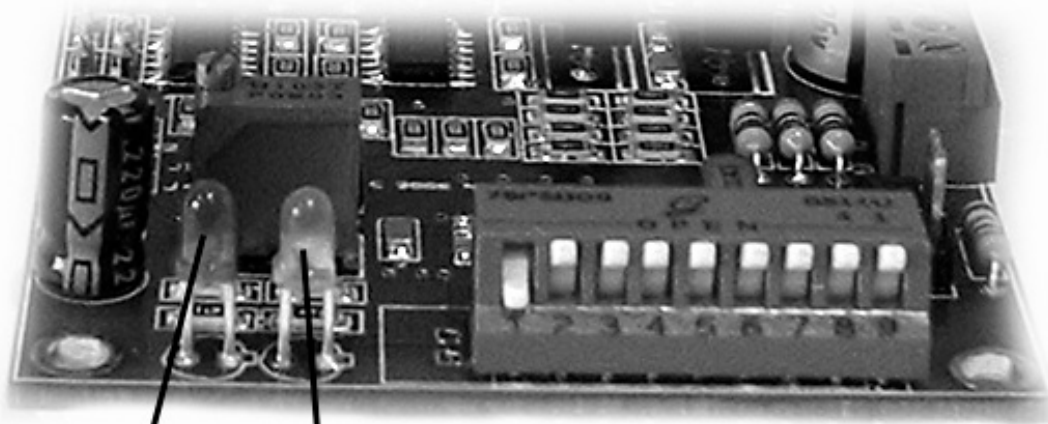
8 Channel decoder connectors



8 channel decoder Address switch and configuration jumpers



Configuration Jumpers



**Power
LED**

**DMX
LED**

Address switch

Mounting the LCD Display

Mounting the LCD display requires drilling 1/8" holes for the mounting screws and 3/8" holes for the switches.

The LCD display requires a rectangular hole for the display.

The LCD assembly can be mounted to a faceplate, and the face plate is then mounted on the enclosure. This is the easiest method, that allows the most margin for error.

It is possible, of course, to drill and mount the LCD assembly directly to the enclosure, however drilling errors are not as easy to repair.

There is a drill template provided. Use a tacky spray glue or tape to affix the template to the metal, then drill and cut through both.

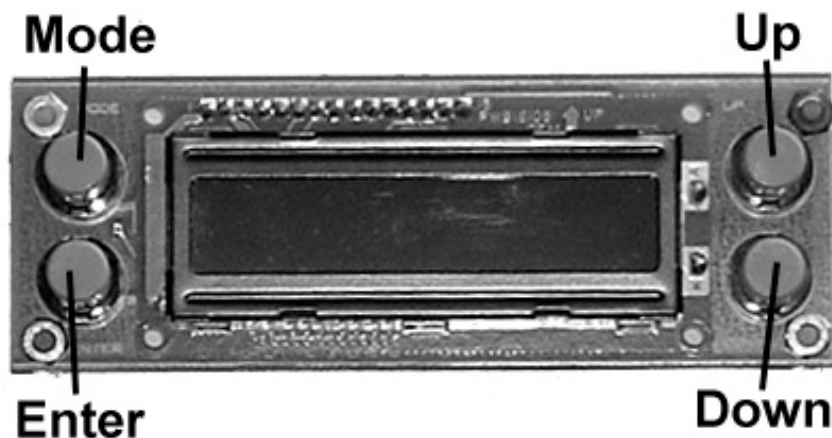
Fiber epoxy circuit board material is easy to work with and is a good material if aluminum is not available. Thin anodized aluminum can be purchased from sign and engraving supply business.

It is recommended that a test be made using heavy card stock or a manilla folder using the templates provided.

Switch Positions

The push button switches are located as pictured below.

The ribbon cable is installed with the ribbon going away from the board.



Using the Decoder

Power Input

14.5 to 18 volts AC or DC.

Average idle current for the 8 channel decoder is 200 milliAmps.

This includes the power for the LCD backlight.

The total current is based on the load. Generally for dimmers this is less than 1 milliAmp per output channel. For solid state relays the output current could increase to 10 milliAmps per output channel. Generally an input current of 300 milliAmps should cover most applications.

It is recommended that a separate power transformer is used to power the board. A standard 12 Vac / 500 milliAmp transformer works well.

Ground

The ground terminal, on the DMX input and the analog output, is the common signal – not earth ground. There are no earth ground connections on the Decoder boards.

The shield on the DMX input is connected to earth ground. Do not use the shield as the common signal ground(pin 1). Do not connect the shield and pin 1 together.

Outputs

Output is an analog voltage spanning 0 – 5 VDC or 0 - 10 VDC @10mA. There are 255 discrete voltage levels for the 0-5 range and 0-10 range.

DMX512 Input connections

The DMX input pin numbers correspond to the XLR pin numbers. The ground pin(1) is signal ground – not earth ground.

PIN	WIRE	SIGNAL
1	shield	ground/return
2	signal	data compliment (-)
3	signal	data true (+)
4	signal	spare data compliment (-)
5	signal conductor	spare data true (+)

Setting the Start Address

Press the MODE button until the LCD screen displays:

Address 001

Use the UP and DOWN buttons to select the start address.
Press ENTER to record the start address.
The display will blink twice to acknowledge the keypress.

The start address is the first address in a group of 8.
Address 000 is not used. Addresses over 512 will be ignored.

Setting the Start code

Press the MODE button until the LCD screen displays:

START CODE 000

Use the UP and DOWN buttons to select the start code.
Press ENTER to record the start code.
The display will blink twice to acknowledge the keypress.

The Decoder boards are capable of receiving a start code from 0 – 255.

DMX512 specifies that the start code for dimmers is 0. The Decoder boards are set to 0 start code by default since this is most common.

Most of the time the start code should not be changed.

The decoder will ignore all DMX512 data when the start codes do not match.

If the Decoder is not responsive set the start code to 0.

The Decoder does not have RDM capability.

Setting the output voltage range

The Decoder boards normally output a voltage from 0-10 Volts. Each channel can be set to a range of 0-5 VDC by pressing the MODE button until the screen displays:

CH 1 - 8 HHHHHHHH

8 output channels are displayed at a time, with H indicating 0 – 10 VDC output and L indicating 0 – 5 VDC output.

The channels are displayed left to right – low to high. In the example above, the left most H is channel 1 and right most H is channel 8.

Use the UP and DOWN buttons to select the channel to change. A blinking cursor will be over the selected channel.

Use the ENTER button to toggle the output level. The change will be recorded and the analog output will change immediately.

Bar graph display

The bar graph is the default mode for the display.

The display is capable of displaying 16 channels at a time. All 32 channels can be displayed on 2 screens.

To access the bar graph display press the MODE button until the screen displays:

AddRESS 001 - 016

The display will show the levels of the DMX512 input for 16 channels starting with the address shown. For example, if the start address is 8 the display will be DMX512 channels 8 - 24.

To see the next 16 channels, use the UP and DOWN buttons to change screens. When viewing channels 17 - 32 the screen will show the address of the channels displayed, not the start address.

The ENTER button is not used in this mode.

Configuration jumpers

Jumper 1

This jumper determines the Decoders action in the event of DMX signal loss.

When this jumper is used the display will shown the last valid DMX levels.

Open – This is the default position for this jumper
In the event of DMX signal loss the output voltage will be 0.

Closed – In the event of DMX signal loss the decoder will hold and continue to output the last valid DMX data.

Setting up the DMX connectors

The current DMX512 standards require one to provide passive loop through connectors.

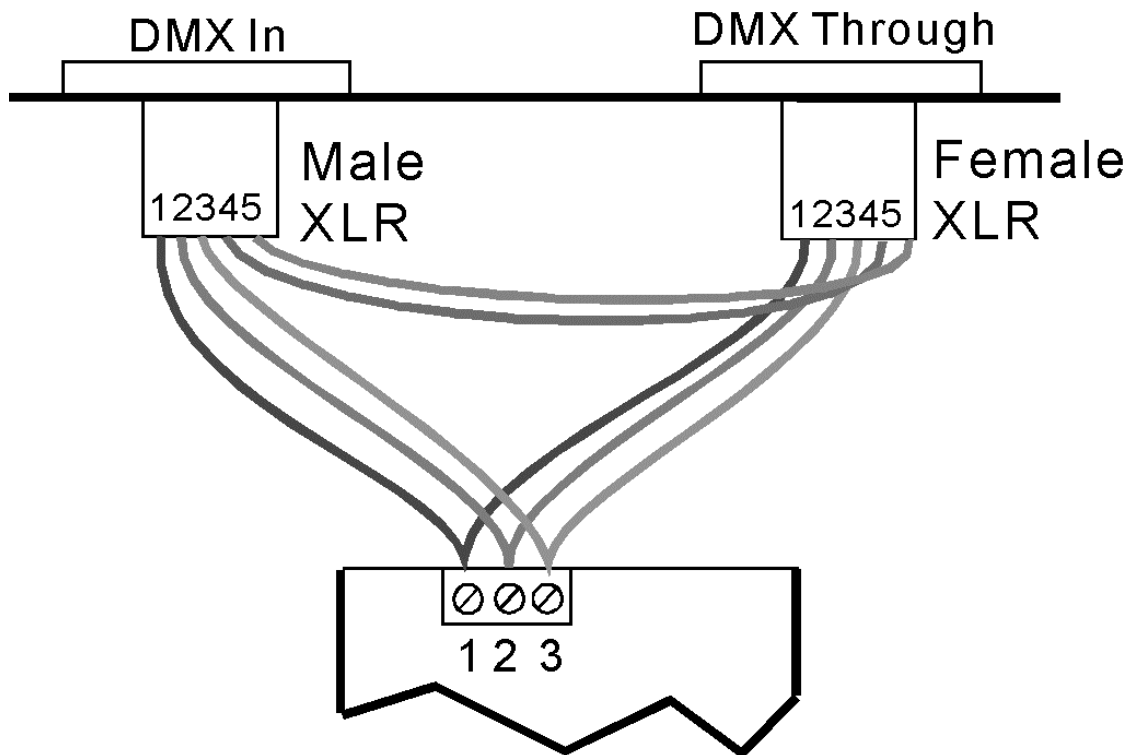
The specific description is below:

Secondary data link - passive loop through ports

Devices containing two DMX512 ports, one for receive and one for transmit, ..., shall provide a direct passive link for all pins between the two ports.

Equipment designers are encouraged to provide passive loop through on Pins 4 and 5 whenever possible, even if not required.

The drawing below shows a typical installation.

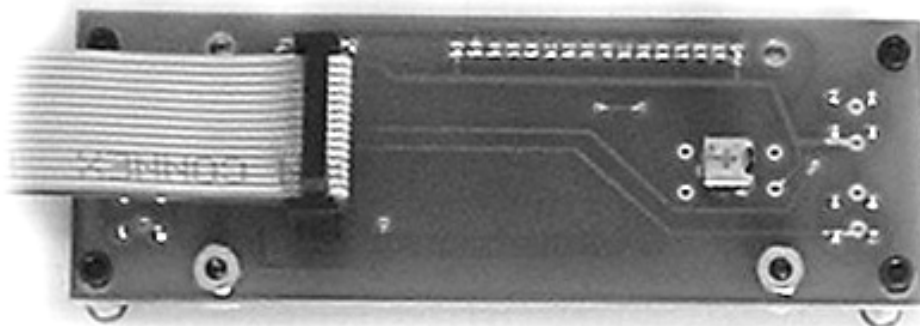


Connecting the LCD display

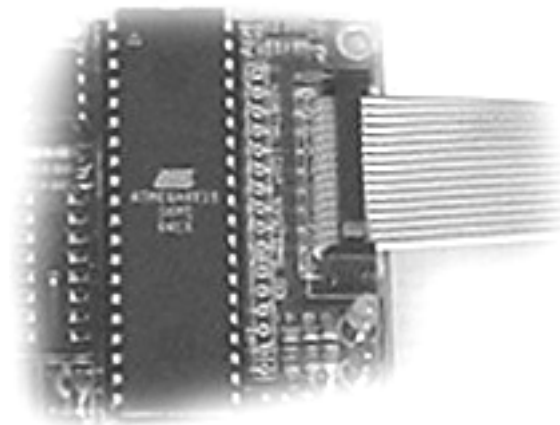
The image below is the display viewed from the front.



The image below is the display viewed from the back.



The image below is the board viewed from the top.



Trouble shooting

Basically the board is plug and play. There are no user adjustments. When all connections are properly made, an analog voltage, proportional to the input signal will be present at the output pins.

Signal Ground/common: On the board, there is NO connection between chassis/earth ground and Signal/common ground. Do not install one.

On the DMX data cable, there is NO connection between the shield/XLR shell earth ground and the signal/common ground. Do not connect these together.

Termination: A terminator resistor is not always required. It is up to the user to determine the termination requirements. If the Decoder board is the last one on the DMX link a jumper can be installed on the jumper pins.

The decoders have a terminating resistor installed on board. It is in the circuit when the jumper is across the jumper pins.

It is possible to “over terminate”. In other words make sure there is only 1 terminator on the end of the DMX line. Other devices may have internal terminators, double check the settings.

Red Power LED: Double check the input power by using a multimeter on the screw terminals of the input power connector. If the red LED is out the power supply may be defective.

Green Signal LED: If the green LED is blinking, there is no valid signal present.

If the LED is on, but dim, and the receiver is not responsive, try to reverse the DMX signal wires. A valid signal will produce a steady bright LED.

Double check the input ground connections. Use a terminator.

No output: Check the signal wires as noted above.

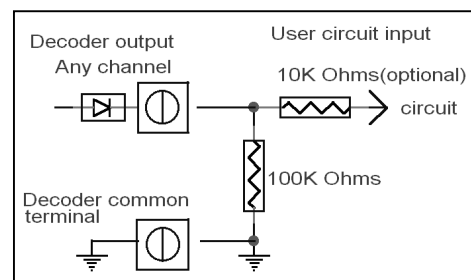
Be sure the address is set to a valid address. The Decoder start address should not be higher than the highest address received.

On the mini DIP switch, up position is off. Down is on.

Did you change the start code? Most of the time the start code is 0.

Erratic output: This problem can be hard to track down. *First* check the input signal integrity. There should be signal present on both Data lines. Reverse the connections.

Another potential problem here is the user circuit interface. It may be necessary to install a 100K resistor between the Decoder board output and the user circuit ground (NOT chassis/earth ground). This is usually already there in most dimmers, except Leprecon dimmers. A typical arrangement is shown schematically above.



Misc. Good solid connections are a must. The micro screw terminals provide good connections. However the screws can be stripped by over tightening. DMX512 signal wires should be twisted together all the way to the connector. It is recommended that a separate transformer be used to power the Decoder board. Occasionally unexpected problems can occur if power is "borrowed" from another source. Small wall wart transformers or standard 12 volt transformers work well for this application.

Some notes about DMX512

DMX 512 is a digital communications protocol that specifies a set of requirements for transmitting and receiving digital signals between lighting controllers and dimmers. There are 2 main components to this spec. The Data Protocol is the meaning of the bits and bytes that are transmitted. Northlight's Decoder is compliant with the full requirements of the Data Protocol. There is a certain amount of flexibility in the signal timing, Northlight's Decoder is capable of receiving data at the full data rate specified.

The other component of DMX512 is the Electrical Specifications. The hardware electrical specs are listed in EIA-485, commonly referred to as the RS-485 specs. The RS-485 standard, specifies only the electrical characteristics of the driver and the receiver to be used at the line interface. Northlight's Decoder is compliant with RS-485. Each Decoder represents less than 1 node load to the system.

RS485 is a data transmission system using balanced differential signals. That is 2 signal wires and signal ground. 3 wires are required.

Splitters/Repeaters

Isolation between the console and dimmers is sometimes required to prevent signal degradation and protect devices from damaging voltages on the control cable. Optically isolated splitters help avoid these problems.

Each DMX512 output can drive up to 32 devices. If there are more devices on the line, a "repeater" or "booster" is required. Some cheap devices are not fully compliant and actually represent a load equivalent to 2 or more devices.

Long or improper cables, electrically noisy environment (generators, motors) and improper use of passive "Y" splitters all contribute to DMX signal degradation. A repeater/booster may help to solve these problems.

Why ask WYE?

Wye(Y) splitters are NOT recommended for DMX512 systems. Wye splitters are simply a male inline XLR connector, parallel wired to 2 female inline XLR's. While convenient, Wye splitters cause unwanted signal reflections and possible ground loops, leading to signal degradation.

The best layout for DMX systems is a Daisy chain configuration, where the signal cable jumps from one device to the next, with no branching. Each chain can have up to 32 devices on it. When using an isolated splitter, each output can be a separate DMX daisy chain with 32 nodes.

Termination

A common problem with DMX systems is improper termination.

A simple terminator consists of a 120 Ohm resistor connected across pins 2-3 of the DMX signal. More complex terminators utilize voltage spike protection and bi-color LEDs to indicate signal integrity.

Terminators are an impedance matching circuit required to damp signals that “reflect “ from the end of an improperly terminated cable, causing signal degradation under certain conditions.

On devices that have a DMX thru , a male XLR connector with terminating resistor connected across pins 2-3 and installed on the DMX thru connector will suffice. Some devices with isolated outputs will not use a terminator on the DMX out. These usually have an internal terminator that is selected with a switch.

Wire Type

There is a difference between microphone cable and “Data” cable. Sure you can get away with mic. cable for short runs in many situations. However on longer runs or marginal situations mic. cable will let you down. You may have random errors or the system won’t work at all. It comes down to insurance. If you want to insure the most reliable DMX signal distribution you need the most appropriate wire for the job. DMX512 requires wire suitable for RS-485, there is no way to get around that.

Twisted-pair cable is the most common wire type. You can use a range of wire gauges, but most frequently use 22 – 24 AWG. The characteristic impedance of the cable should be 100 to 120 Ohms.

Some other requirements are, at least 1 twisted pair plus ground and shield. It should have low capacitance and overall braid and foil shield.

Data Rate VS Cable Length

At 250K bits per second the max cable length is about 1000 ft for DMX512 in good conditions.

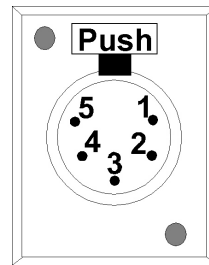
Connectors

DMX512 protocol specifies that 5 pin XLR connectors be used. Female on the transmitter and male on the receiver.

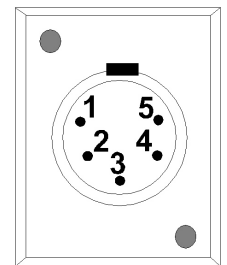
When a 3 pin XLR is used it is wired the same as the first 3 pins on the 5 pin XLR.

PIN	WIRE	SIGNAL
1	shield	ground/return
2	signal	data compliment (-)
3	signal	data true (+)
4	signal	spare data compliment (-)
5	signal conductor	spare data true (+)

Conductors 2/3 and 4/5 should be twisted together.



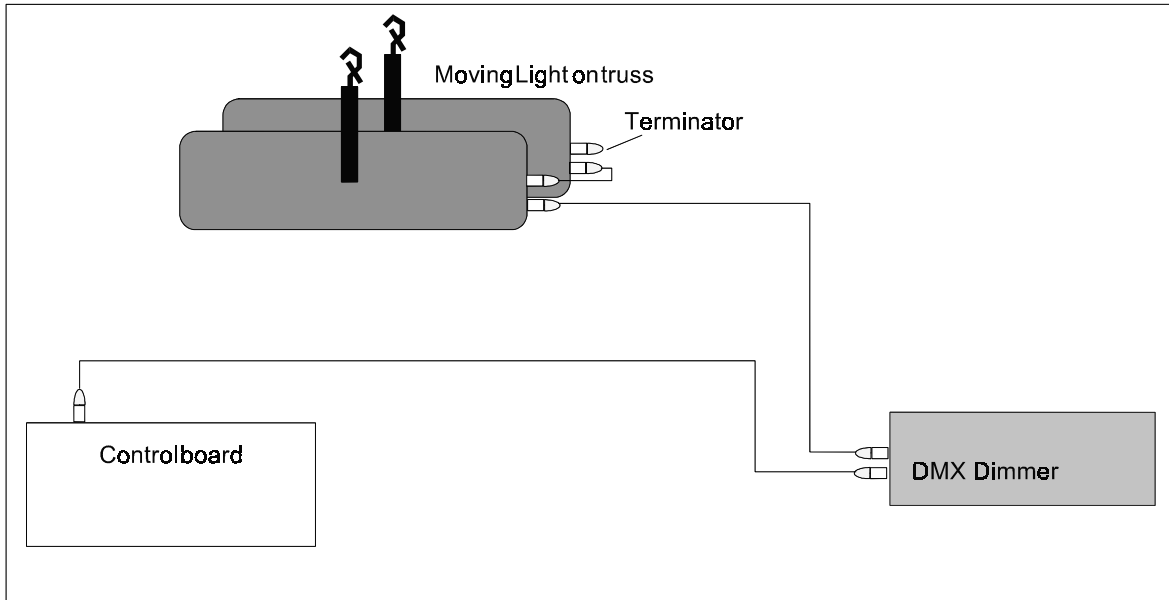
OUTPUT



INPUT

Typical DMX signal routing

Simple setup



A more complicated setup. The Isolated splitter greatly simplifies cable routing and keeps individual runs short.

