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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 the splitter is defective, 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, 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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NORTHLIGHT SYSTEMS DMX512 Isolated Splitter Circuit Board

Northlight systems isolated signal splitter PCB for DMX 512 offers full electrical isolation between the input and 3 outputs. Each output has it's own line driver and optical isolator.

In addition to signal isolation, power isolation is achieved with a UL listed split bobbin transformer and separate power supplies for the input and output sections.

The DMX splitter also serves as a repeater since each output drives up to 32 receivers.

A non-isolated DMX thru is provided.

Features

- ✍ Circuit board accepts Neutrik PC mount, 5 pin XLR's
- ✍ Input is electrically isolated from the outputs. Devices are protected from failure at either end.
- ✍ Outputs are isolated from each other.
- ✍ Outputs are separately buffered.
- ✍ Each output drives up to 32 receivers.
- ✍ Signal problems on one output cannot affect another output.
- ✍ Switch selectable termination.
- ✍ Uses 2500 volt optical couplers.
- ✍ Easily isolates line voltage failures.
- ✍ Data throughput higher than required.
- ✍ Power and input signal indicators.

LED indicator

Red LED's for power supplies A(DMX input) and B(DMX output).
Green LED indicates input signal present.

Power

120 VAC / 50/60Hz .

Can be ordered for use with 220 VAC, no additional cost.

Specs

All specifications meet or exceed requirements for DMX512.

ESD Protection to $\pm 10\text{kV}$ on inputs and outputs protect against multiple ESD strikes of over $\pm 10\text{kV}$ using the Human Body Model.

Baud rate: 0 to 250 KB

Input circuit: EIA-485 compatible receiver,

Input signal: 0.2 volts minimum, 12 volts maximum

Output circuit: Fast, 2500 volt optical isolators
EIA-485 compatible drivers

Connectors: 5 pin XLR pc mount

Power Isolation: Split bobbin, UL listed transformer

Power input: 110 - 120 volts, 60 hertz, 1 amp. 220 volt available
on request .

PC mount fuse, not user servicable.

Case Fits PAC plastic and extruded aluminum.

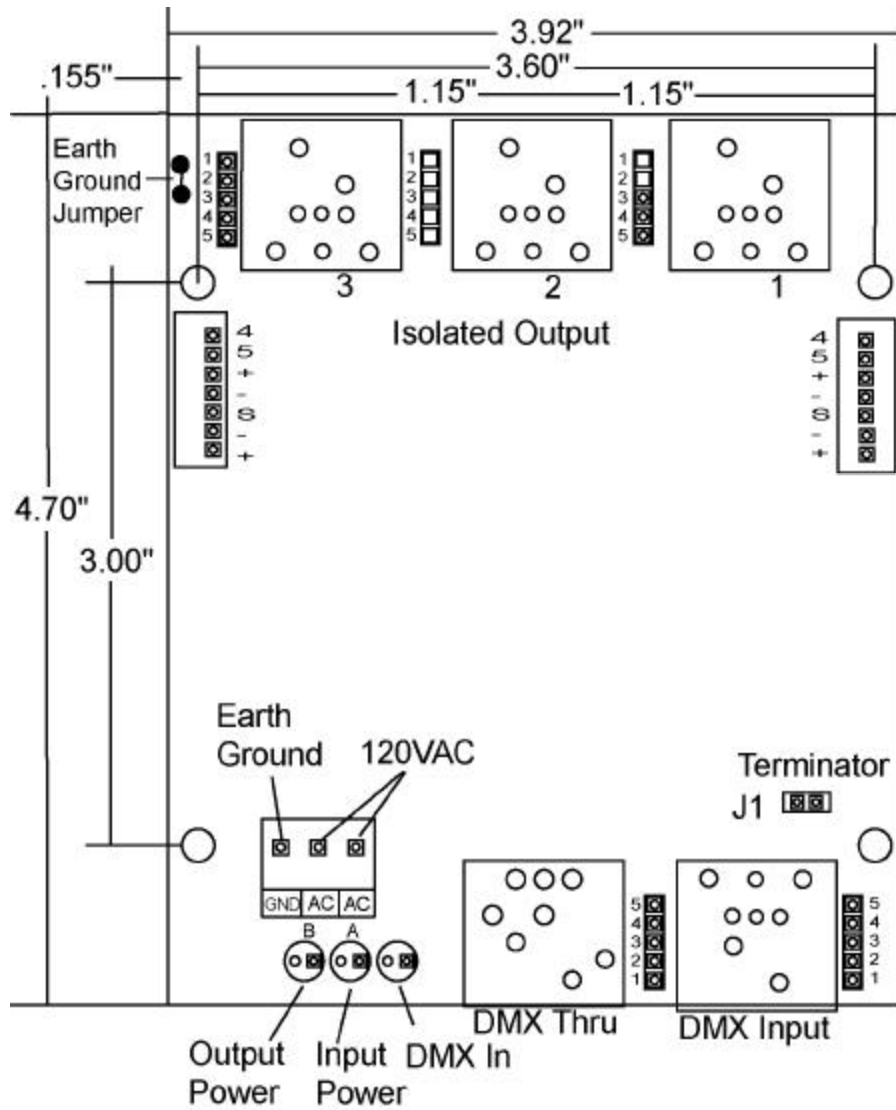
Dimensions: 3 output,5 pin XLR: 4.70 X 3.90" wide

Input terminator: Selected by toggle switch attached to the PCB.

Dimensions

Outside dimensions 4.70" X 3.92"

Overall height 1.70"



XLR Connectors

DMX Input: 1 - Male XLR, 5 pin Neutrik NC5MAH pc mount, 5 pin XLR
 DMX thru: 1 - Female XLR, 5 pin Neutrik NC5FAH pc mount, 5 pin XLR
 DMX out: 3 - Female XLR, 5 pin Neutrik NC5FAH pc mount, 5 pin XLR

DMX512 protocol specifies that 5 pin XLR connectors be used. A female connector should be on the transmitter end and a male XLR on the receiver end.

Some manufacturers use 3 pin XLR's for DMX. The connector is wired the same as the first 3 pins of the 5 pin connector.

The current draft for DMX512-A specifies that 3 pin XLR connectors are not acceptable.

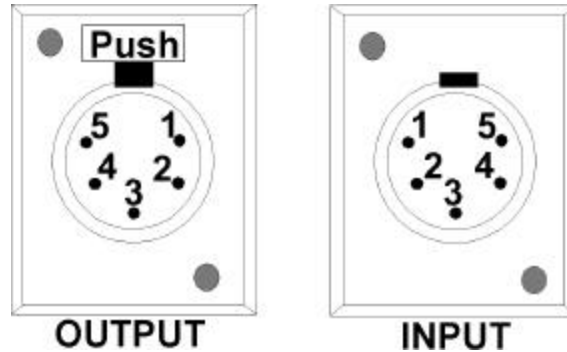
Just because a manufacturer uses 3 pin XLR's does not imply that microphone wire is suitable DMX signal distribution.

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

Signal Designation

| Use | Pin Reference | DMX512 Function |
|---------------------|---------------|-----------------|
| Data Link Common | 1 | Common |
| Primary Data Link | 2 | Data - |
| | 3 | Data + |
| Secondary Data Link | 4 | Data 2 - |
| | 5 | Data 2 + |

Pin locations for 5 pin XLR connectors



DMX Thru connector

The Thru connector is a passive pass through. It is non-isolated, and the signal common is at the same potential as the input pin 1.

Usage of Pins 4 and 5 – Secondary data link

Northlights isolated splitter provides a passive loop through for pins 4 and 5 to all three output connectors.

Enclosure

The mounting holes in the board fit the mounting bosses in the PacTec CM5-200 plastic enclosure. Dimension 5.20”L X 5.10”W X 2.20”H.

This is a good choice for use with panel mount XLR connectors.

The LED’s can be bent to protrude through the end panel.

The DMXiso3 board will also fit a Hammond extruded aluminum enclosure.

These are available with plastic or aluminum end panels.

Dimensions 4.72”L X 4.04”W X 2.09H.

Hammond Part# 1455N1201Bk with aluminum end panels.

Hammond part# 1455N1202Bk with plastic end panels.

This is a good choice for

use with PC mount XLR

connectors.



Terminator

The DMXiso3 has an onboard terminator resistor. The connector for the terminator is labeled J1.

A slide switch or toggle switch is the usual choice to select termination.

According to the DMX512 standard, the switch positions should be labeled “in” and “out”.

Isolated Receiver

The receiver has a fail-safe feature which guarantees a high output state when the inputs are left open

The current draft of DMX512 recommends:

“DMX512 systems should make use of earth ground referenced transmitting devices and isolated receiving devices. This approach provides for a single point solid ground/chassis connection at the source, and allows for variations in building ground potentials between transmitting and receiving devices. “

Northlight’s splitter is an isolated receiving device and is isolated from earth ground.

The figure below illustrates the Northlight isolated receiver.

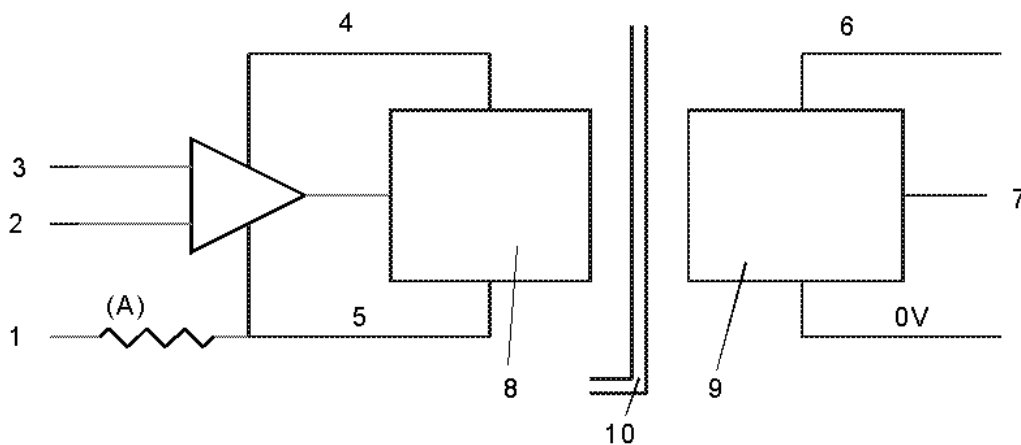


Figure Key

- 1 - DMX512 Pin 1
- 2 - DMX512 Pin 2
- 3 - DMX512 Pin 3
- 4 - Isolated Supply
- 5 - Isolated 0V Supply
- 6 - V (+ or -)
- 7 - I / O
- 8 - Isolated Electronics
- 9 - Non-Isolated Electronics
- 10 - Isolation Barrier
- A - Optional resistance

Ground Referenced Transmitter

Earth grounding of data link common for transmitters

The current DMX512 protocol defines two allowable topologies for the earth grounding of data link common and circuit common for transmitters, to be known as “Ground Referenced” and “Isolated”.

The preferred method is “Ground Referenced”.

Northlights isolated splitter provides an earth ground on the 3 isolated transmitters.

The earth ground is provided by the AC cord.

The transmitter ground is separate from the receiver portion of the splitter.

To separate the earth ground from the isolated output, use wire cutters to cut the earth ground jumper.

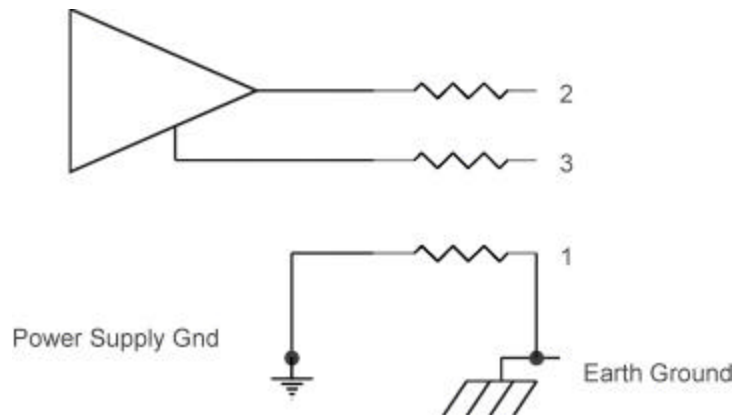
A DMX512 device may have any number of Ground Referenced transmitter ports.

Ground Referenced transmitter ports may be used by all DMX512 devices including ones that provide any number of non-DMX512 input or output ports. Adherence to this topology allows a DMX512 transmitter connector to be marked as GROUNDLED.

Northlights splitter is grounded.

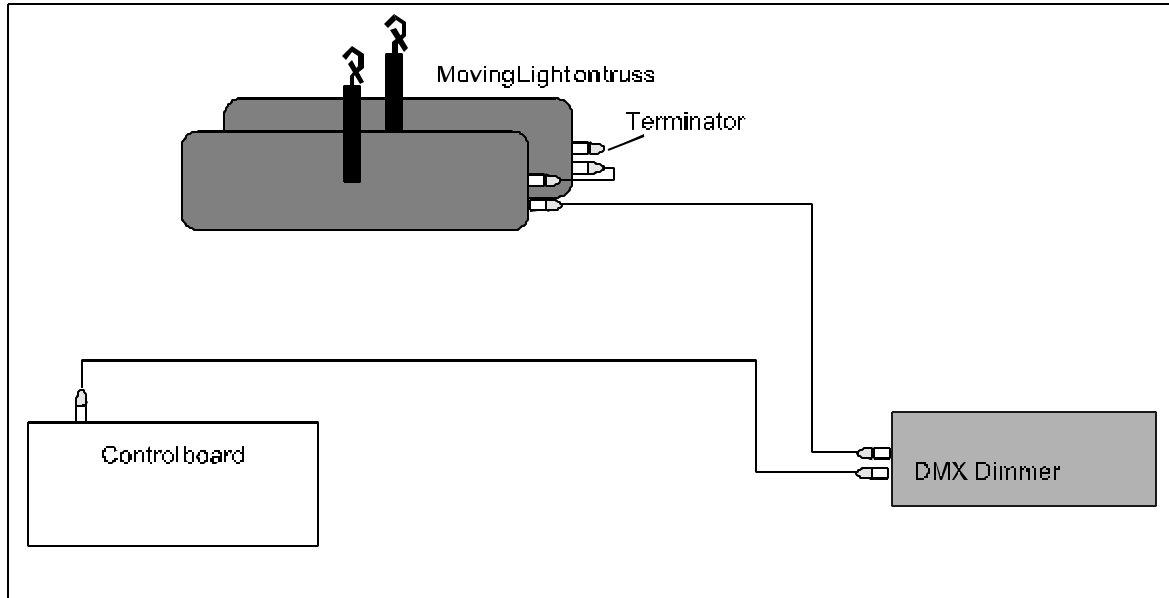
The figure below illustrates the splitter ground referenced transmitter port. It is characterized by the direct connection of Pin 1 to protective earth.

All resistors are 10 Ohm.

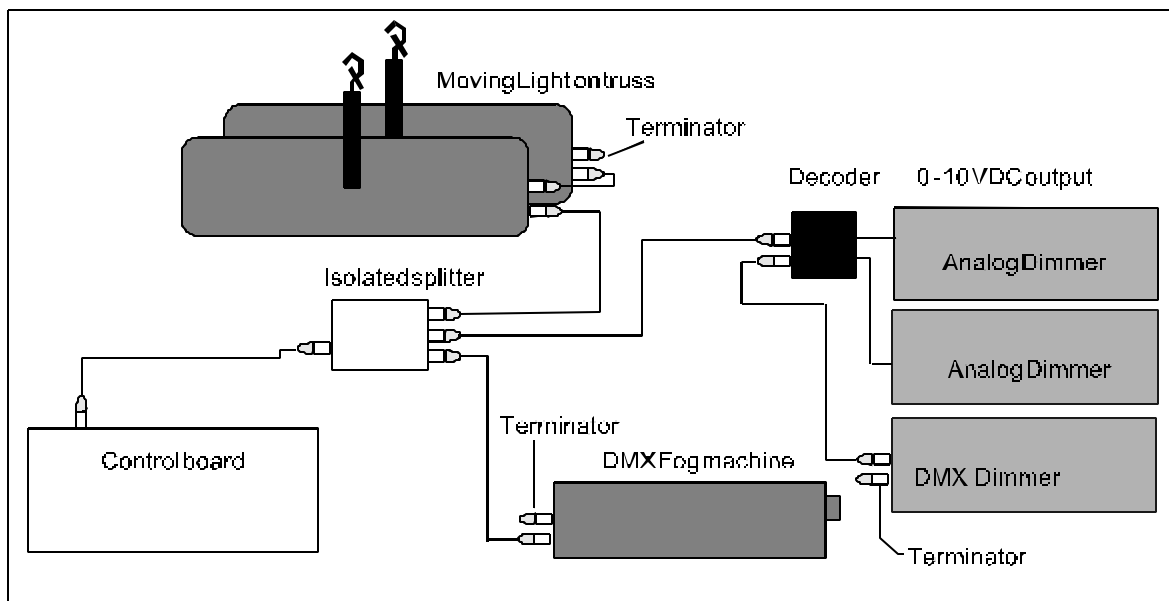


Typical Installation

A simple system without a splitter.



A more complicated system using a splitter. Even if there is no electrical requirement for a splitter, it sure makes DMX wire routing a lot easier.



Some notes on DMX512

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

Splitters are also used to facilitate easy routing of DMX cables and to shorten cable runs. For example when DMX devices are mounted on a truss and the dimmers are on the ground, it is a lot easier to use a splitter than to daisy chain up to the truss.

Northlight's splitter also serves as a repeater. Each output can drive up to 32 devices.

DMX 512 and RS-485

DMX512 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. The other component of DMX512 is the electrical specifications, also called the physical layer.

The hardware electrical specs are listed in EIA 485, commonly called RS-485. The RS-485 standard, specifies only the electrical characteristics of the driver and the receiver to be used at the line interface, this is what isolated splitters must adhere to. Northlight's DMX splitter is fully compliant with RS-485 specs.

RS-485 is a data transmission system using balanced differential signals. That is 2 signal wires and signal common.

A minimum of 3 wires are required. An overall braid and foil shield is recommended.

The 2 signal wires should be twisted together for the entire length of the cable.

Why ask WYE?

Wye splitters, Y leads or DMX twofers, whatever you call them, are not recommended for DMX512 systems.

Y splitters are simply a male inline XLR connector, parallel wired to 2 female inline XLR's. While this is convenient, Y splitters may 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.

Termination:

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

Northlight’s splitter contains a terminating resistor that is selected by a jumper or a toggle switch mounted on the enclosure front panel.

When the “DMX thru” connector is used, the splitter is not the last device on the link and the terminator should not be used. The toggle switch should be set to “out”.

If the splitter is the last receiver on the link, then the toggle switch should be set to “In”.

Ground:

The signal common, pin 1, on the female XLR is not connected to earth/chassis ground. The shield wire is sometimes connected the earth/chassis ground at the transmitter only. Do not connect signal ground to earth ground. Earth ground originates at the power mains(or it should). If a ground fault appears on the power system, AC voltage can be present on the DMX signal ground. This is a hazard to your health and may destroy the DMX gear it is connected to.

The signal common on the outputs of Northlight’s splitter is floating with respect to the input circuit signal common. All three of the outputs share a common power supply and the associated signal common. The output are earth grounded through the AC power cord.

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 data transmission, there is no way to get around that.

Twisted-pair cable is required. You can use a range of wire gauges, but most use 18 - 22 AWG.

Some minimum requirements are, at least 1 twisted pair plus ground and shield. It should have low capacitance and have overall braid and foil shield. The characteristic impedance of the cable should be 100 to 120 Ohms.

Cable and Data Rate

The preferred transmission line for RS-485 communications is a twisted pair.

Twisted pair cable tends to cancel common-standard mode noise and the magnetic fields generated by the current flowing through each wire, thereby reducing the effective common-inductance of the pair.

At 250K bits per second the maximum cable length is about 1000 ft, under good conditions.

Trouble shooting

Terminator: A common problem with DMX systems is improper termination. When the DMX Thru connector is not used the terminator switch should be set to "In".

If the DMX Thru connector is used the terminator switch should be set to "Out". Other equipment may have a switch to select the built in terminator. It is important to be sure there is not 2 terminators on the DMX line. Make sure the terminator is at the end of the line.

Wire/routing: Problems caused by improper wire type or routing will not necessarily be cured by the use of a splitter. However splitters may help in this situation since a better route or shorter cable runs can be facilitated by the use of splitters.

The routing of the signal wire can be an issue in certain situations. Running the DMX cable parallel to main power cables is not recommended. Even worse is to run the DMX cable among the dimmer load(output) cables. Of course it is often impossible to avoid running a DMX cable across AC cables. At least avoid running the cables in parallel for long runs. This is a situation where a good quality "Data" cable comes in handy.

Power led: Both red LED's should be on in normal operation. If both LED's are dark, the splitter probably not getting power. If only 1 red LED is on the power supply in the splitter is defective.

Fuse: An inline fuse is provided on the PC board. This is not a user serviceable item. If the fuse is blown(no red LED's), the splitter must be returned for repair.

Green signal led: A steady green led indicates a signal present.

If the green LED in on and there is no output or only some outputs work then the splitter may be defective.