

## **24 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, use with motor controllers or LED drivers that have analog input.

Outputs 255 discrete voltage levels.

High quality screw terminals are provided.

Choice of address switches.

Push button address switch is direct reading, no "charts" needed.

### **SPECS**

**Input Signal:** Northlight decoder board accepts DMX 512A and legacy versions. The decoder board can receive data at the full rate. The decoder is responsive to all 512 channels.

**Output:** Output is 24 channels @ 0-5 or 0 – 10 volts, 10 milliAmps/channel. The output voltage has 255 discrete levels.

**Address switch:** Choice of Mini DIP switch or Push button.

### **Power requirements:**

Voltage

15 to 24 volts DC

12 – 18 VAC

Current

Average idle current for the 24 channel decoder is 100 milliAmps

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 a current of 250 milliAmps should cover the bases.

It is recommended that a separate power transformer is used to power the board.

### **LED Indicators:**

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 – 30 AWG. See drawing for connector locations.

### **.Ground**

Pin 1 on the XLR connector is the signal common – not earth ground. There are no earth ground connections on the Decoder boards.

Do not install and earth ground to Pin 1 on the XLR.

### **Outputs**

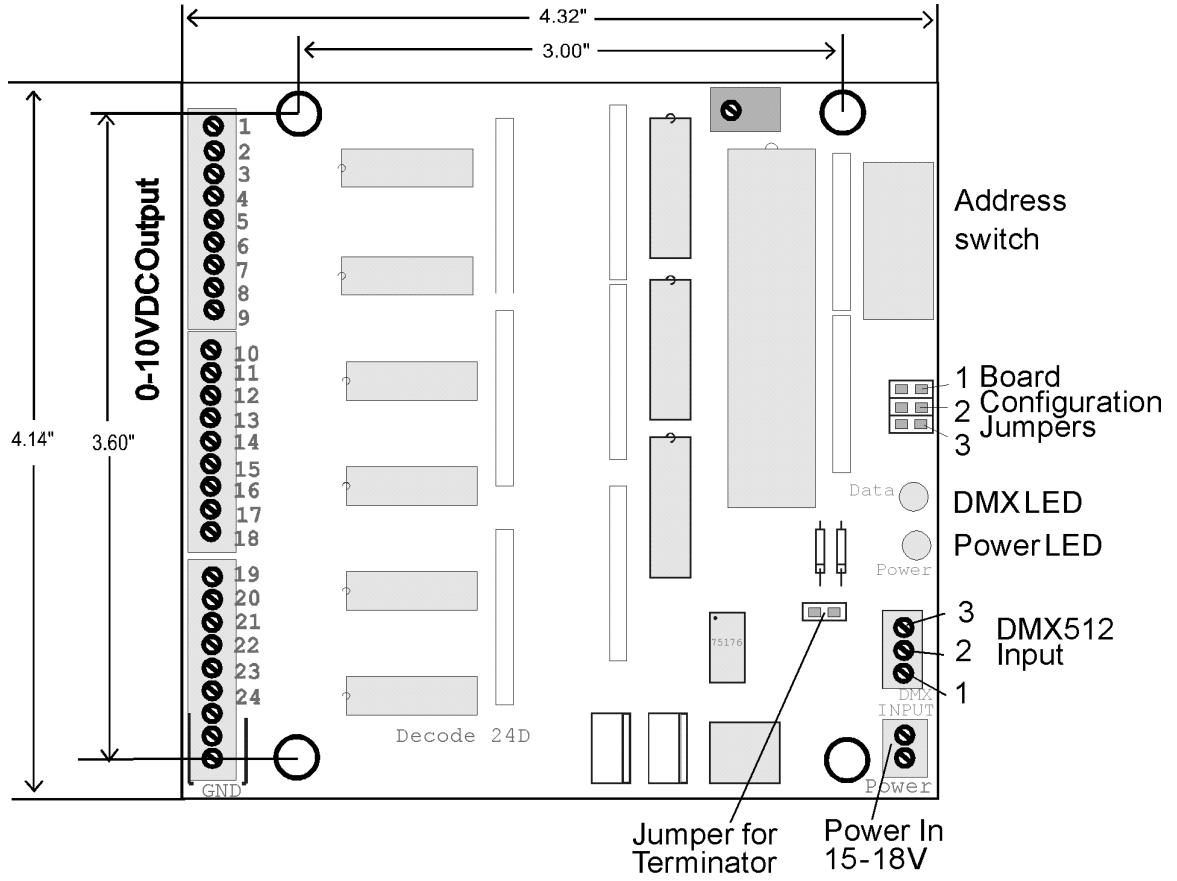
Output is an analog voltage spanning 0 – 5 VDC or 0 - 10 VDC @10mA. There are 255 discrete levels.

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**Physical Dimensions: 24 Channel board**

4.30" X 4.15" +/- .10"



### DMX512 In

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

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

### Terminator

When the jumper pins are shorted, the DMX input is terminated with a 120 Ohm resistor across DMX Input pins 2 and 3.

### Address Switch

Two switch options are offered.

When using the mini DIP switch, the address is entered in the standard binary code starting with 1. See the chart of 512 switch positions at the back of this manual.

The individual switches are numbered 1 – 9 , left to right, on the switch.

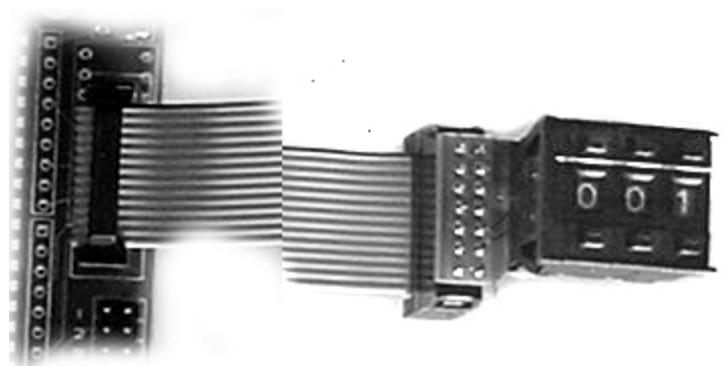
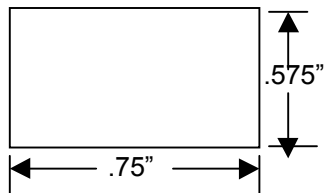
The **Push button** address switch is a snap fit for a panel up to .13” thick.

The switch connects to board via 14 pin ribbon cable. The ribbon cable is installed with the ribbon going away from the board.

When using the Push button switch, set the starting address to the first in a group of 8. Start with address 1 up to 512.

### Switch mounting

Mounting hole for the push button switch



### LED mounting

Drill a 3/16” hole in the panel. Insert the LED holder in the panel from the front. Then insert the LED in the holder from the back side.

### Mounting the Mini DIP switch / panel mount

1. Cut a 1.25” X 1.75” hole where you want the switch to be.
2. Then place switch panel in the hole.
3. Mark the mounting holes.
4. Remove the switch panel.
5. Drill 1/8” mounting holes.

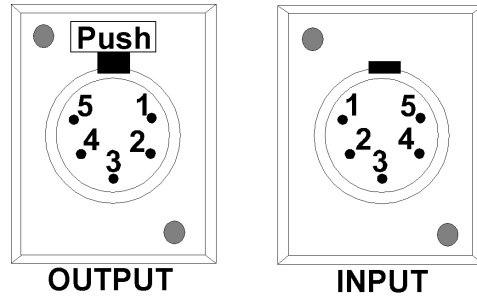
**Setting the start address**

**Mini Dip switch**

When using the DIP switches, set the starting address to the first in a group of 8. The address is entered in the standard binary code starting with 1. See the chart of 511 switch positions at the back of this manual

**Push Button switch**

With the push button switch the address is entered direct, starting with 1.



**Using the configuration jumpers**

There are 3 configuration jumpers on the Decoder.

**J1** – Determines the DMX output in the event of DMX receive signal loss.

**Open**(no jumper) – When the DMX receive is lost, the last valid input data will be cleared after a period of no valid DMX. Subsequent analog output will be zero.

**Closed**(jumper in place) – When the DMX receive is lost the Decoder will hold and continue to output the last valid data.

**J2** – Determines the output voltage range.

**Open**(no jumper) – The output will span a range from 0-10VDC.

**Closed**(jumper in place) – The output will span a range from 0-5VDC.

**J3** – Selects Dim or Non-Dim (relay)

**Open**(no jumper) – The decoder will output 0-10 VDC, proportional to the DMX level.

**Closed**(jumper in place) – At a level of 75%(DMX192) , the output will snap from fully off to fully on.

Any level below 192 the output will be 0VDC. Above 192 the output will be 10 VDC or 5VDC, depending on jumper 2.

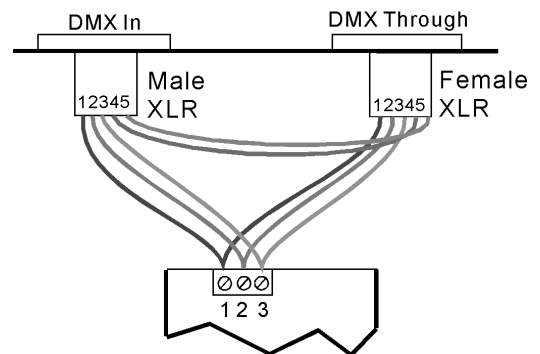
**Setting up the DMX connectors**

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.

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

The drawing shows a typical installation.



PIN	WIRE	SIGNAL
1	signal	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.

**Termination**

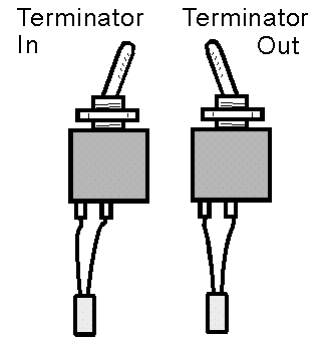
Terminators are an impedance matching circuit required to damp signals that “reflect “ from the end of an improperly terminated cable, causing signal degradation under certain conditions.

A simple terminator consists of a 120 Ohm resistor connected across pins 2-3 of the DMX signal

The decoder provides an on board terminator using standard square pin connectors on .10” centers.

A toggle switch can be placed across the terminals for convenient front panel terminator selection.

The termination resistor should only be in when the decoder is the last device on the DMX link.



In the drawing on the right, note the leads are offset to one side. There is no specific orientation of the connector on the PC board.

The latest version of the DMX512 specifies that the terminator switch should be labeled “In” and “Out”.

**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:**

It is up to the user to determine the termination requirements. If the Decoder board is the last one on the DMX link the built in 120 terminating resistor can be used.

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

**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.

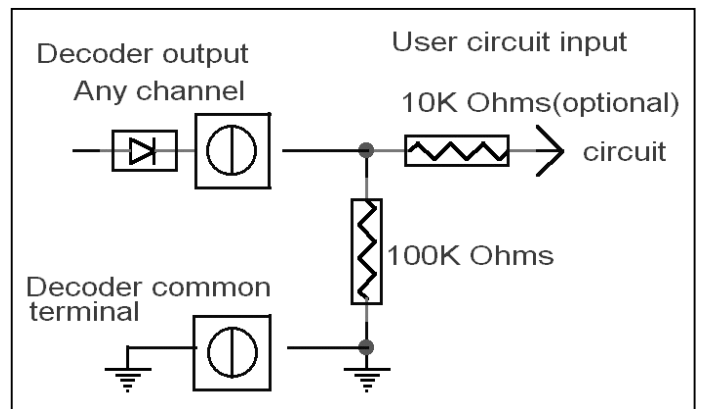
Double check the input ground connections. Use a terminator.

**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.

**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 47K to 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.

The DIP switches must be fully set. There should be an audible click when they are flipped.

**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.

## DMX512 Decoder

Address - Switches	Address - switches	Address - switches	Address - switches
1 = 1	64 = 7	127 = 1, 2, 3, 4, 5, 6, 7	190 = 2, 3, 4, 5, 6, 8
2 = 2	65 = 1, 7	128 = 8	191 = 1, 2, 3, 4, 5, 6, 8
3 = 1, 2	66 = 2, 7	129 = 1, 8	192 = 7, 8
4 = 3	67 = 1, 2, 7	130 = 2, 8	193 = 1, 7, 8
5 = 1, 3	68 = 3, 7	131 = 1, 2, 8	194 = 2, 7, 8
6 = 2, 3	69 = 1, 3, 7	132 = 3, 8	195 = 1, 2, 7, 8
7 = 1, 2, 3	70 = 2, 3, 7	133 = 1, 3, 8	196 = 3, 7, 8
8 = 4	71 = 1, 2, 3, 7	134 = 2, 3, 8	197 = 1, 3, 7, 8
9 = 1, 4	72 = 4, 7	135 = 1, 2, 3, 8	198 = 2, 3, 7, 8
10 = 2, 4	73 = 1, 4, 7	136 = 4, 8	199 = 1, 2, 3, 7, 8
11 = 1, 2, 4	74 = 2, 4, 7	137 = 1, 4, 8	200 = 4, 7, 8
12 = 3, 4	75 = 1, 2, 4, 7	138 = 2, 4, 8	201 = 1, 4, 7, 8
13 = 1, 3, 4	76 = 3, 4, 7	139 = 1, 2, 4, 8	202 = 2, 4, 7, 8
14 = 2, 3, 4	77 = 1, 3, 4, 7	140 = 3, 4, 8	203 = 1, 2, 4, 7, 8
15 = 1, 2, 3, 4	78 = 2, 3, 4, 7	141 = 1, 3, 4, 8	204 = 3, 4, 7, 8
16 = 5	79 = 1, 3, 4, 7	142 = 2, 3, 4, 8	205 = 1, 3, 4, 7, 8
17 = 1, 5	80 = 5, 7	143 = 1, 2, 3, 4, 8	206 = 2, 3, 4, 7, 8
18 = 2, 5	81 = 1, 5, 7	144 = 5, 8	207 = 1, 2, 3, 4, 7, 8
19 = 1, 2, 5	82 = 2, 5, 7	145 = 1, 5, 8	208 = 5, 7, 8
20 = 3, 5	83 = 1, 2, 5, 7	146 = 2, 5, 8	209 = 1, 5, 7, 8
21 = 1, 3, 5	84 = 3, 5, 7	147 = 1, 2, 5, 8	210 = 2, 5, 7, 8
22 = 2, 3, 5	85 = 1, 3, 5, 7	148 = 3, 5, 8	211 = 1, 2, 5, 7, 8
23 = 1, 2, 3, 5	86 = 2, 3, 5, 7	149 = 1, 3, 5, 8	212 = 3, 5, 7, 8
24 = 4, 5	87 = 1, 2, 3, 5, 7	150 = 2, 3, 5, 8	213 = 1, 3, 5, 7, 8
25 = 1, 4, 5	88 = 4, 5, 7	151 = 1, 2, 3, 5, 8	214 = 2, 3, 5, 7, 8
26 = 2, 4, 5	89 = 1, 4, 5, 7	152 = 4, 5, 8	215 = 1, 2, 3, 5, 7, 8
27 = 1, 2, 4, 5	90 = 2, 4, 5, 7	153 = 1, 4, 5, 8	216 = 4, 5, 7, 8
28 = 3, 4, 5	91 = 1, 2, 4, 5, 7	154 = 2, 4, 5, 8	217 = 1, 4, 5, 7, 8
29 = 1, 3, 4, 5	92 = 3, 4, 5, 7	155 = 1, 2, 4, 5, 8	218 = 2, 4, 5, 7, 8
30 = 2, 3, 4, 5	93 = 1, 3, 4, 5, 7	156 = 3, 4, 5, 8	219 = 1, 2, 4, 5, 7, 8
31 = 1, 2, 3, 4, 5	94 = 2, 3, 4, 5, 7	157 = 1, 3, 4, 5, 8	220 = 3, 4, 5, 7, 8
32 = 6	95 = 1, 2, 3, 4, 5, 7	158 = 2, 3, 4, 5, 8	221 = 1, 3, 4, 5, 7, 8
33 = 1, 6	96 = 6, 7	159 = 1, 2, 3, 4, 5, 8	222 = 2, 3, 4, 5, 7, 8
34 = 2, 6	97 = 1, 6, 7	160 = 6, 8	223 = 1, 2, 3, 4, 5, 7, 8
35 = 1, 2, 6	98 = 2, 6, 7	161 = 1, 6, 8	224 = 6, 7, 8
36 = 3, 6	99 = 1, 2, 6, 7	162 = 2, 6, 8	225 = 1, 6, 7, 8
37 = 1, 3, 6	100 = 3, 6, 7	163 = 1, 2, 6, 8	226 = 2, 6, 7, 8
38 = 2, 3, 6	101 = 1, 3, 6, 7	164 = 3, 6, 8	227 = 1, 2, 6, 7, 8
39 = 1, 2, 3, 6	102 = 2, 3, 6, 7	165 = 1, 3, 6, 8	228 = 3, 6, 7, 8
40 = 4, 6	103 = 1, 2, 3, 6, 7	166 = 2, 3, 6, 8	229 = 1, 3, 6, 7, 8
41 = 1, 4, 6	104 = 4, 6, 7	167 = 1, 2, 3, 6, 8	230 = 2, 3, 6, 7, 8
42 = 2, 4, 6	105 = 1, 4, 6, 7	168 = 4, 6, 8	231 = 1, 2, 3, 6, 7, 8
43 = 1, 2, 4, 6	106 = 2, 4, 6, 7	169 = 1, 4, 6, 8	232 = 4, 6, 7, 8
44 = 3, 4, 6	107 = 1, 2, 4, 6, 7	170 = 2, 4, 6, 8	233 = 1, 4, 6, 7, 8
45 = 1, 3, 4, 6	108 = 3, 4, 6, 7	171 = 1, 2, 4, 6, 8	234 = 2, 4, 6, 7, 8
46 = 2, 3, 4, 6	109 = 1, 3, 4, 6, 7	172 = 3, 4, 6, 8	235 = 1, 2, 4, 6, 7, 8
47 = 1, 2, 3, 4, 6	110 = 2, 3, 4, 6, 7	173 = 1, 3, 4, 6, 8	236 = 3, 4, 6, 7, 8
48 = 5, 6	111 = 1, 2, 3, 4, 6, 7	174 = 2, 3, 4, 6, 8	237 = 1, 3, 4, 6, 7, 8
49 = 1, 5, 6	112 = 5, 6, 7	175 = 1, 2, 3, 4, 6, 8	238 = 2, 3, 4, 6, 7, 8
50 = 2, 5, 6	113 = 1, 5, 6, 7	176 = 5, 6, 8	239 = 1, 2, 3, 4, 6, 7, 8
51 = 1, 2, 5, 6	114 = 2, 5, 6, 7	177 = 1, 5, 6, 8	240 = 5, 6, 7, 8
52 = 3, 5, 6	115 = 1, 2, 5, 6, 7	178 = 2, 5, 6, 8	241 = 1, 5, 6, 7, 8
53 = 1, 3, 5, 6	116 = 3, 5, 6, 7	179 = 1, 2, 5, 6, 8	242 = 2, 5, 6, 7, 8
54 = 2, 3, 5, 6	117 = 1, 3, 5, 6, 7	180 = 3, 5, 6, 8	243 = 1, 2, 5, 6, 7, 8
55 = 1, 2, 3, 5, 6	118 = 2, 3, 5, 6, 7	181 = 1, 3, 5, 6, 8	244 = 3, 5, 6, 7, 8
56 = 4, 5, 6	119 = 1, 2, 3, 5, 6, 7	182 = 2, 3, 5, 6, 8	245 = 1, 3, 5, 6, 7, 8
57 = 1, 4, 5, 6	120 = 4, 5, 6, 7	183 = 1, 2, 3, 5, 6, 8	246 = 2, 3, 5, 6, 7, 8
58 = 2, 4, 5, 6	121 = 1, 4, 5, 6, 7	184 = 4, 5, 6, 8	247 = 1, 2, 3, 5, 6, 7, 8
59 = 1, 2, 4, 5, 6	122 = 2, 4, 5, 6, 7	185 = 1, 4, 5, 6, 8	248 = 4, 5, 6, 7, 8
60 = 3, 4, 5, 6	123 = 1, 2, 4, 5, 6, 7	186 = 2, 4, 5, 6, 8	249 = 1, 4, 5, 6, 7, 8
61 = 1, 3, 4, 5, 6	124 = 3, 4, 5, 6, 7	187 = 1, 2, 4, 5, 6, 8	250 = 2, 4, 5, 6, 7, 8
62 = 2, 3, 4, 5, 6	125 = 1, 3, 4, 5, 6, 7	188 = 3, 4, 5, 6, 8	251 = 1, 2, 4, 5, 6, 7, 8
63 = 1, 2, 3, 4, 5, 6	126 = 2, 3, 4, 5, 6, 7	189 = 1, 3, 4, 5, 6, 8	252 = 3, 4, 5, 6, 7, 8

## Northlight Systems

### Address - switches

253 = 1, 3, 4, 5, 6, 7, 8  
254 = 2, 3, 4, 5, 6, 7, 8  
255 = 1, 2, 3, 4, 5, 6, 7, 8  
256 = 9  
257 = 1, 9  
258 = 2, 9  
259 = 1, 2, 9  
260 = 3, 9  
261 = 1, 3, 9  
262 = 2, 3, 9  
263 = 1, 2, 3, 9  
264 = 4, 9  
265 = 1, 4, 9  
266 = 2, 4, 9  
267 = 1, 2, 4, 9  
268 = 3, 4, 9  
269 = 1, 3, 4, 9  
270 = 2, 3, 4, 9  
271 = 1, 2, 3, 4, 9  
272 = 5, 9  
273 = 1, 5, 9  
274 = 2, 5, 9  
275 = 1, 2, 5, 9  
276 = 3, 5, 9  
277 = 1, 3, 5, 9  
278 = 2, 3, 5, 9  
279 = 1, 2, 3, 5, 9  
280 = 4, 5, 9  
281 = 1, 4, 5, 9  
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283 = 1, 2, 4, 5, 9  
284 = 3, 4, 5, 9  
285 = 1, 3, 4, 5, 9  
286 = 2, 3, 4, 5, 9  
287 = 1, 2, 3, 4, 5, 9  
288 = 6, 9  
289 = 1, 6, 9  
290 = 2, 6, 9  
291 = 1, 2, 6, 9  
292 = 3, 6, 9  
293 = 1, 3, 6, 9  
294 = 2, 3, 6, 9  
295 = 1, 2, 3, 6, 9  
296 = 4, 6, 9  
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305 = 1, 5, 6, 9  
306 = 2, 5, 6, 9  
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310 = 2, 3, 5, 6, 9  
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313 = 1, 4, 5, 6, 9  
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315 = 1, 2, 4, 5, 6, 9  
316 = 3, 4, 5, 6, 9  
317 = 1, 3, 4, 5, 6, 9  
318 = 2, 3, 4, 5, 6, 9  
329 = 1, 2, 3, 4, 5, 6, 9  
320 = 7, 9  
321 = 1, 7, 9  
322 = 2, 7, 9  
323 = 1, 2, 7, 9

### Address - switches

324 = 3, 7, 9  
325 = 1, 3, 7, 9  
326 = 2, 3, 7, 9  
327 = 1, 2, 3, 7, 9  
328 = 4, 7, 9  
329 = 1, 4, 7, 9  
330 = 2, 4, 7, 9  
331 = 1, 2, 4, 7, 9  
332 = 3, 4, 7, 9  
333 = 1, 3, 4, 7, 9  
334 = 2, 3, 4, 7, 9  
335 = 1, 2, 3, 4, 7, 9  
336 = 5, 7, 9  
337 = 1, 5, 7, 9  
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339 = 1, 2, 5, 7, 9  
340 = 3, 5, 7, 9  
341 = 1, 3, 5, 7, 9  
342 = 2, 3, 5, 7, 9  
343 = 1, 2, 3, 5, 7, 9  
344 = 4, 5, 7, 9  
345 = 1, 4, 5, 7, 9  
346 = 2, 4, 5, 7, 9  
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390 = 2, 3, 8, 9  
391 = 1, 2, 3, 8, 9  
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394 = 2, 4, 8, 9

### Address - switches

395 = 1, 2, 4, 8, 9  
396 = 3, 4, 8, 9  
397 = 1, 3, 4, 8, 9  
398 = 2, 3, 4, 8, 9  
399 = 1, 2, 3, 4, 8, 9  
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404 = 3, 5, 8, 9  
405 = 1, 3, 5, 8, 9  
406 = 2, 3, 5, 8, 9  
407 = 1, 2, 3, 5, 8, 9  
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409 = 1, 4, 5, 8, 9  
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413 = 1, 3, 4, 5, 8, 9  
414 = 2, 3, 4, 5, 8, 9  
415 = 1, 2, 3, 4, 5, 8, 9  
416 = 6, 8, 9  
417 = 1, 6, 8, 9  
418 = 2, 6, 8, 9  
419 = 1, 2, 6, 8, 9  
420 = 3, 6, 8, 9  
421 = 1, 3, 6, 8, 9  
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425 = 1, 4, 6, 8, 9  
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431 = 1, 2, 3, 4, 6, 8, 9  
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433 = 1, 5, 6, 8, 9  
434 = 2, 5, 6, 8, 9  
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436 = 3, 5, 6, 8, 9  
437 = 1, 3, 5, 6, 8, 9  
438 = 2, 3, 5, 6, 8, 9  
439 = 1, 2, 3, 5, 6, 8, 9  
440 = 4, 5, 6, 8, 9  
441 = 1, 4, 5, 6, 8, 9  
442 = 2, 4, 5, 6, 8, 9  
443 = 1, 2, 4, 5, 6, 8, 9  
444 = 3, 4, 5, 6, 8, 9  
445 = 1, 3, 4, 5, 6, 8, 9  
446 = 2, 3, 4, 5, 6, 8, 9  
447 = 1, 2, 3, 4, 5, 6, 8, 9  
448 = 7, 8, 9  
449 = 1, 7, 8, 9  
450 = 2, 7, 8, 9  
451 = 1, 2, 7, 8, 9  
452 = 3, 7, 8, 9  
453 = 1, 3, 7, 8, 9  
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455 = 1, 2, 3, 7, 8, 9  
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462 = 2, 3, 4, 7, 8, 9  
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464 = 5, 7, 8, 9  
465 = 1, 5, 7, 8, 9

### Address - switches

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468 = 3, 5, 7, 8, 9  
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493 = 1, 3, 4, 6, 7, 8, 9  
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496 = 5, 6, 7, 8, 9  
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498 = 2, 5, 6, 7, 8, 9  
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506 = 2, 4, 5, 6, 7, 8, 9  
507 = 1, 2, 4, 5, 6, 7, 8, 9  
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510 = 2, 3, 4, 5, 6, 7, 8, 9  
511 = 1, 2, 3, 4, 5, 6, 7, 8, 9  
512 = 0



## ***Warranty and Disclaimer***

### **Warranty**

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

### **Returns Policy**

If there is a defect, we will repair or replace the product at our discretion.

We offer a full refund on the purchase price if returned in original, unused and “like new”, condition in less than 30 days.

Return the product with a description of the problem. Free repairs are for defective parts or workmanship only.

Repairs due to improper hookup, over voltage, short circuits, physical damage etc., will be charged to the customer.

### **Disclaimer of Liability**

Northlight Systems is not responsible for any special, incidental, or consequential damages resulting from 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.

### **Contact**

Northlight Systems

Voice 480 949 2625

Email [info@NorthlightDMX.com](mailto:info@NorthlightDMX.com)