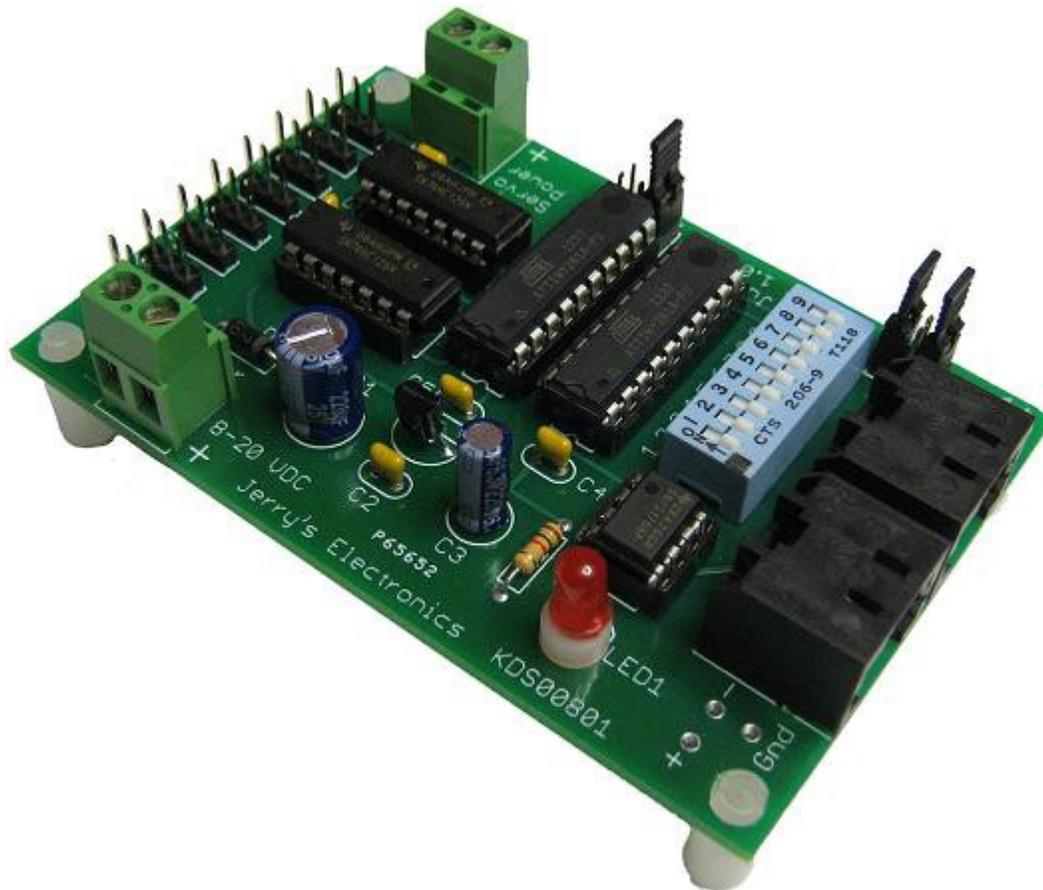# KDS00801 8-Channel DMX Controlled Servo Kit

This is a DMX512-A controlled servo kit using ANSI approved RJ-45 connectors for DMX networks. Power requirements are 8 - 20 VDC @ 50 ma. The board features an LED for power indication, screw terminal blocks for electronics power and servo power, 8 - "Futaba" compatible 3 pin servo connectors, solder points for hard wiring a external DMX connector, dip switch for DMX address selections and jumpers for termination/options.

What's Included in the kit:

- 1 - Quality PC Board
- 1 - SN75176 Bus Transceiver IC
- 2 - 74126 Buffer IC's
- 1 - DIP Switch 9-Position
- 2 - 14 Pin IC Sockets
- 2 - 220ufd Electrolytic Capacitors
- 1 - LED
- 1 - 1.5k ¼ Watt Resistor (brown, green, red)
- 1 - 120 ohm Resistor (brown, red, brown)
- 2 - 6 Pin Headers
- 8 - 3 Pin Headers

- 2 - Pre-Programmed Controller IC's
- 1 - 78L05A Voltage Regulator
- 1 - 1N4002 Diode
- 2 - 20 Pin IC Sockets
- 1 - 8-Pin IC Socket
- 5 - 0.1ufd 50v Ceramic Capacitors (104)
- 1 - LED Spacer
- 2 - 2 Position Terminal Block
- 2 - RJ45 Jacks
- 3 - Header Jumpers
- 4 - PCB Standoffs

What you will need:

1. Good quality soldering iron 25 – 40 watt
2. Solder tip cleaning sponge
3. Rosin core or no clean solder
4. Diagonal wire cutter

Basic instructions:

Insert parts from top side (component side) of PC board.
Parts should be fully inserted, most parts will touch PC board.
If parts are polarity sensitive, double check your installation.
On some parts you can bend the leads after inserting to help hold them in place.
While soldering apply a small amount of solder to the solder tip to help with heat transfer.
Touch the soldering tip to both the component lead and PC board.
To improve your solder connection apply solder to part/PC board instead of solder tip.
The solder should flow around the component lead and on the PC board.
Avoid adding too much solder or too much heat.
Your solder connection should be shiny and smooth, not balled or grainy looking.
If your solder connection is grainy looking try adding some flux and reheat the joint.
Cold solder connections are the most common beginner mistakes.
Cold solder joints happen when the part lead and/or the PC board are not heated well.
After soldering trim the component leads close to the solder joint.
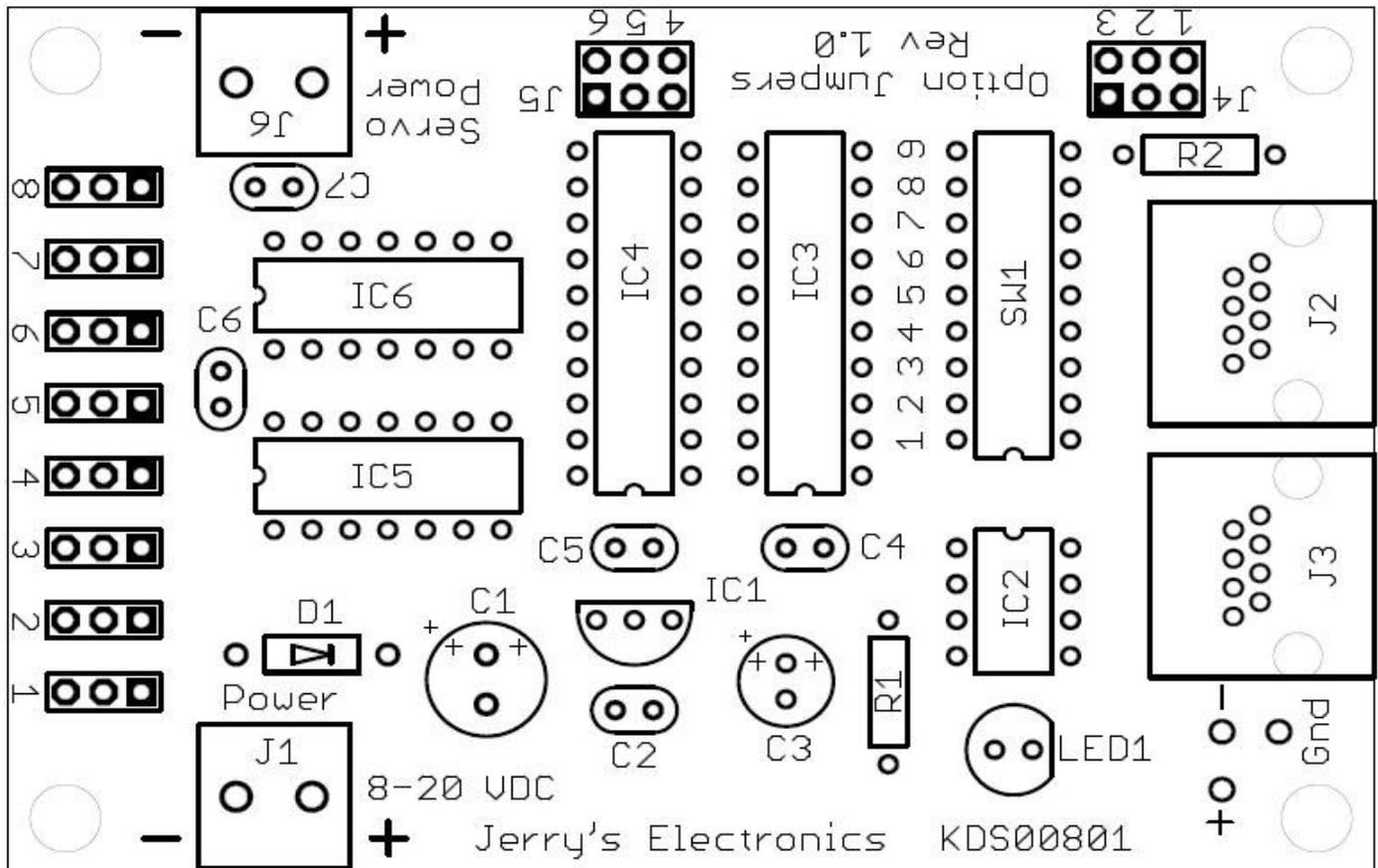
To ease assembly install parts in the following order:

1. R1 - 1.5K Resistor (brown, green, red)
2. R2 - 120 ohm Resistor (brown, red, brown)
3. D1 - 1N4002 Diode (observe polarity)
4. C2,4,5,6,7 - 0.1ufd 50v Ceramic Capacitors (104)
5. 2 - 20 Pin IC Sockets in IC3,4 locations (observe orientation)
6. 8 Pin IC Socket in IC2 location (observe orientation)
7. 2 - 14 Pin IC Sockets in IC5,6 locations (observe orientation)
8. IC1 - LM78L05 Regulator (observe orientation)
9. SW1 - DIP Switch 9-position (observe orientation)
10. J4,5 - 6 Pin Headers
11. 8 - 3 Pin Headers (on left edge of PCB, see above drawing)
12. C1 - 220ufd 25v Electrolytic Capacitor (observe polarity)
13. C3 - 220ufd 6.3v Electrolytic Capacitor (observe polarity)
14. LED1 - Insert LED through the LED spacer then PCBoard (observe polarity)
15. J1,6 - Terminal Block Green (observe orientation)
16. J2,3 - RJ-45 Jacks
17. IC2 - SN75176 Bus Transceiver IC (observe orientation)
18. IC5,6 - 74126 Buffer IC's (observe orientation)
19. IC3 - ATTiny Programmed Micro-controller IC * Blue Dot * (observe orientation)
20. IC4 - ATTiny Programmed Micro-controller IC * Red Dot * (observe orientation)
21. PCB Standoffs

Assembly Tips:

- Clean solder tip with sponge before each solder connection – not after, solder should be balled on end of iron when not using, this increases the soldering tip life.

- Not everyone has a ESD Protected Area, here are a few basic tips to follow:
  a: Do not assemble kit on a carpeted work surface.
  b: Do not assemble kit in low humidity environment (<40% RH = increased risk).
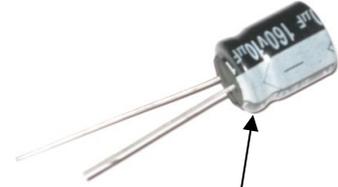 c: Avoid working/walking in carpeted areas.

Schematic:
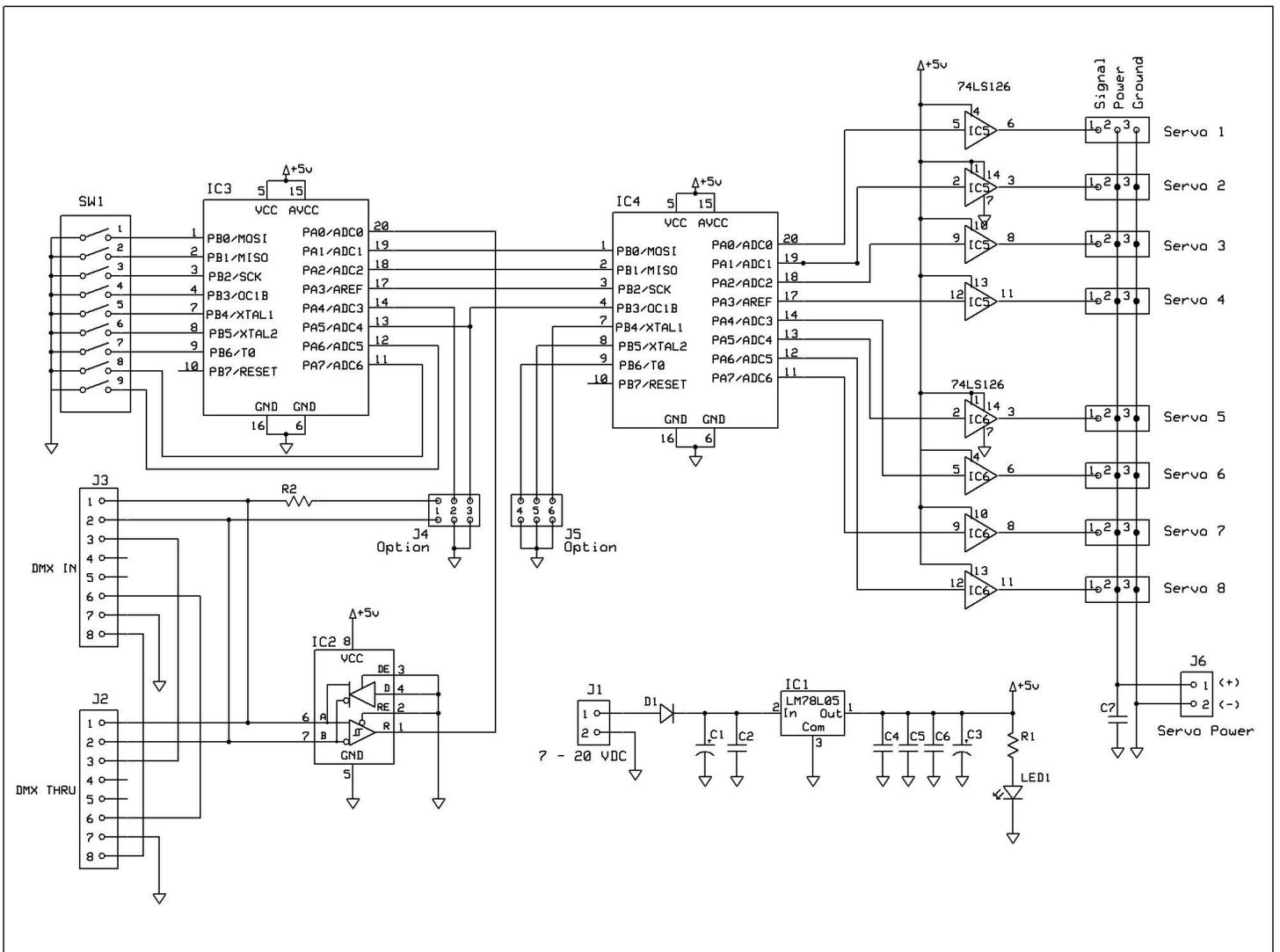
Parts Identification:
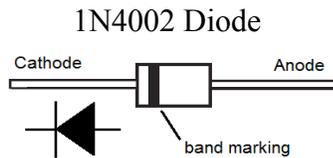
LED's
Flat side indicates Cathode
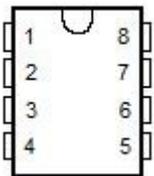or negative lead
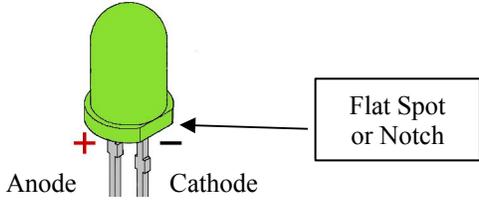
Aluminum Electrolytic Capacitors

Flat Spot
or Notch

Anode   Cathode

The (-) sign on this
white stripe indicates
the negative lead, the
stripe can be any
color.

Attiny261

20 19 18 17 16 15 14 13 12 11
1 2 3 4 5 6 7 8 9 10

ATTiny261A
Top View

1N4002 Diode

Cathode   Anode

band marking

SN75176
Top View

1 8
2 7
3 6
4 5

74126
Top View

14 13 12 11 10 9 8
1 2 3 4 5 6 7

LM78L05
5 Volt Reg

in
gnd
out
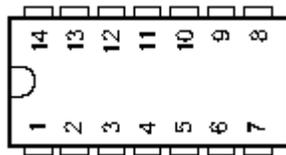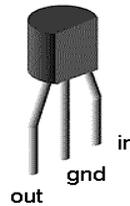
Setting the DIP Switches:

Set the switches to the DMX starting address desired for servo #1, servo #2 through #8 will use the next addresses. The DMX address selection DIP switch is in BCD format (binary coded decimal), but from least significant (left) to most significant (right) as shown below:

O 1 2 3 4 5 6 7 8 9
N

1 2 4 8 16 32 64 128 256
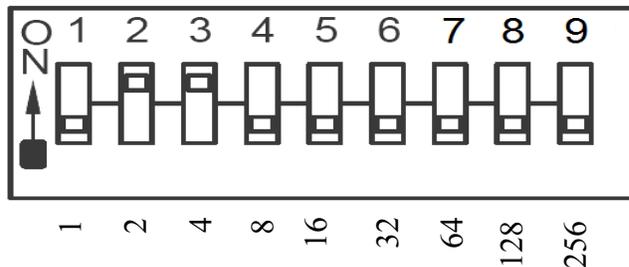
You simply add the BCD values together for each switch that is up or on, for instance the above switches give a DMX address of # 6.

Servo connections:

Hook your power supply for your servo's here, it can also be a battery.

Signal is top pin – usually a white or yellow wire from the servo go here

Ground the bottom pin closest to edge of board – usually the servo wire is black at this pin

V+ positive power center pin – usually red on most servo's go here
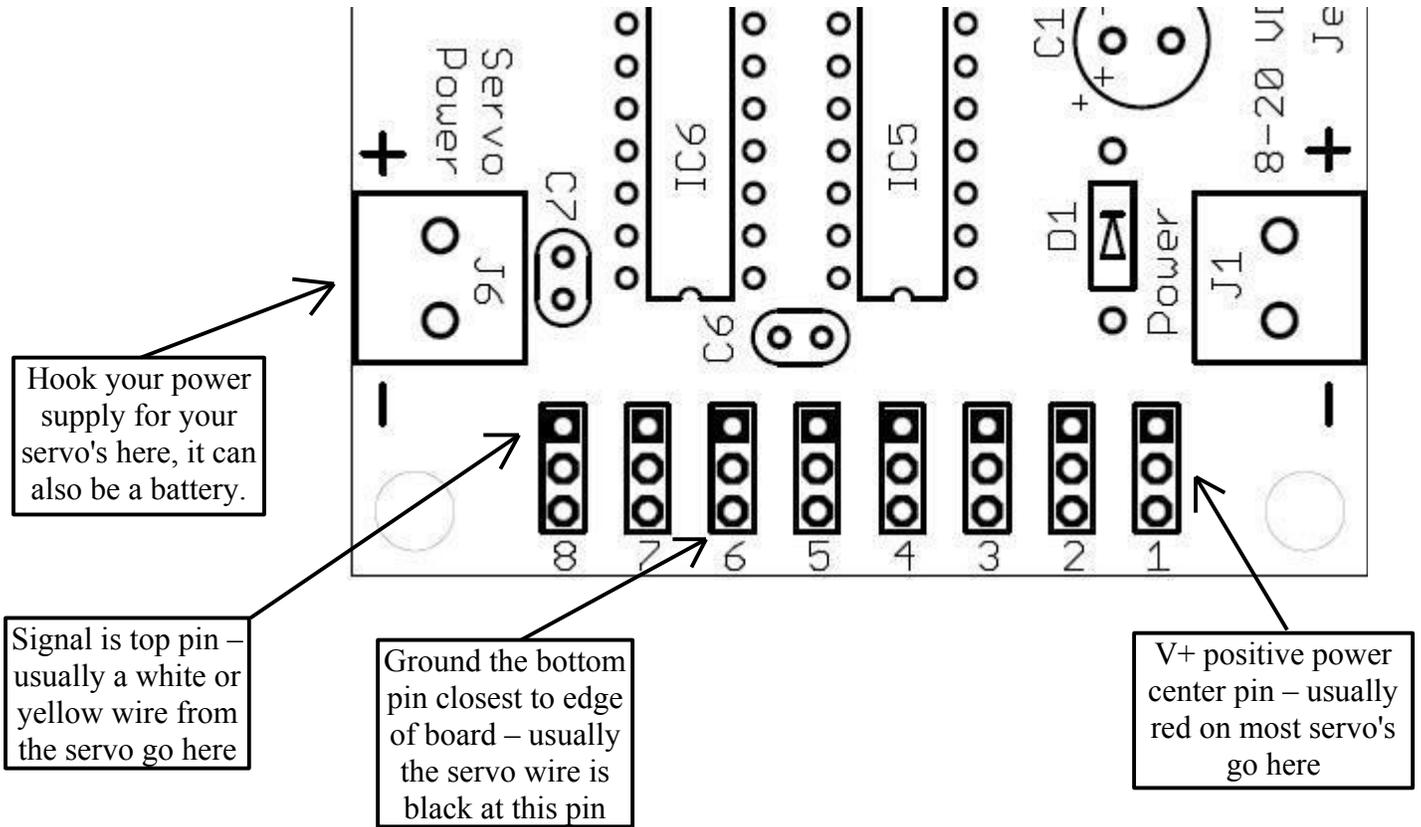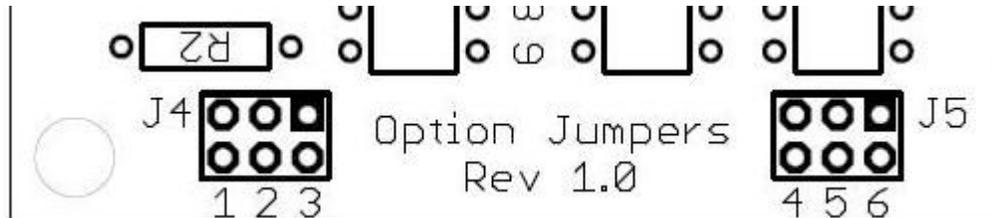
Your servo's plug in these 8 connectors, the pin closest to edge of board is ground (-), the black wire of most servo's plugs should be near edge of board.

Jumpers:

Jumper #1 - Install a jumper in location #1 to enable the DMX terminator resistor if this device is the final device on the DMX daisy chain.

Jumper #2 – Currently not used

Jumper #3 – Currently not used

Jumper #4 – Install jumper for extended servo travel - pulse = .75 ms to 2.25 ms.
         Without jumper for standard servo travel - pulse = 1ms to 2ms

Jumper #5 – Currently not used

Jumper #6 – Hold/Release – install jumper for servo release if DMX signal is lost for more
         than 4 seconds. Without jumper for servo hold - servo's updated constantly.

Troubleshooting:

If your kit doesn't work, be sure to check for solder shorts and cold solder joints.
This is just a basic troubleshooting guide and it assumes all components are good.

   1 - Is the power LED on?
       Yes – proceed to step 2
       No – check IC1, D1 orientation and your power supply hookup.

   2 - Are the IC's inserted correctly?
       Yes – proceed to step 3
       No – remove and insert correctly, they may be damaged or caused damage to other
             components.

   3 – Remove jumper #6 are the servo's holding? They should be centered with power applied.
        Yes – proceed to step 4
        No – check that servo's are properly connected to PC board, check servo power connections and
             power supply operation.

    4 – Check the setting of the DMX address switch on the board and on your DMX source,
             DMX signal being applied is faulty or reversed.