



What is DMX?

DMX 512 is a standard protocol by means of which theatre lighting control desks can communicate with lighting equipment. It was designed to allow equipment from different companies to be used together easily.

Originally developed to control lighting dimmers, it is now used to control Color scrollers, Moving lights, Smoke machines and almost any equipment that can be controlled digitally. Note that as it is an 8 bit protocol many moving lights use 2 channels to provide 16 bit resolution.

What it should not be used to do:

The DMX protocol does NOT have any form of error correction! Therefore it must not be used to control Pyro's or any stage equipment or effect that could present a hazard if it was to be triggered unexpectedly. For these applications Midi Show Control (MSC) 2 with 2 phase commit can be used with reasonable safety, however it is generally accepted that this sort of work should be accomplished with hardwired switches.

Electrical details

DMX 512 is RS485 serial at 250 Kbaud, as such any installation must meet the requirements of EIA-485. In particular use of suitable good quality cable is important (Mic cable is NOT suitable) suitable cables include (but are not limited to):

- * Belden 9841
- * Belden 9842
- * Alpha 5274

RS485 is NOT the same thing as RS232 It cannot be made from a standard PC serial port. You can damage a DMX device by attempting to plug RS232 into it!

Wiring practice

At the speed DMX works correct wiring practice is important and must be done in a conventional 'daisy-chain' format. Always arrange wiring such that a cable starts from the DMX data source and goes in and out of each item of equipment in turn, never split or 'star' off to additional devices - it won't work!

Line termination

All DMX lines must be correctly terminated if reliable operation is to be obtained. Some equipment has a switchable line terminating resistor built in. In these cases make sure that only the last item in the chain has its terminating switch set to on. If the last item (farthest from data source) does not have a terminating switch then an external line terminating network is needed.

This is achieved by soldering a 120 ohm resistor across pins 2 and 3 of a male XLR plug and connecting to the DMX out socket on the last receiving device..

A simple DMX tester

With any DMX network it is ideal to have some kind of DMX test device to check the installation. This tester can be used instead of a line terminator to provide a simple means of checking for cable continuity.

Parts required :

- 1 Male 5 Pin XLR
- 2 270 ohm 1/2 watt resistor.
- 1 Bi-Color LED.

Wiring as follows:

The Bi-Color led has 2 LED's (one Red and one Green) back to back in the same package. Build this into the back of a 5 pin XLR with the LED showing out of the back. To use insert into the socket that you want to test, Set all channels to 0% (Preheat also = 0) The led should glow one color. Run all channels up to Full power (You may need to turn the dimmers off!) The LED should glow the other color. If the led fails to light in any one of the 2 above states then there is a short between one of the lines and pin 1.

Connectors

The DMX standard specifies 5 Pin XLR style connectors, However only 3 pins have standardised uses. The remaining pair (Second data link) are used for anything from Overtemp. indication to supplying power to control desks! If using equipment from more than one manufacturer check the spec. carefully as to the use that is made of these pins, it is generally best not to connect pins 4 and 5 if you are not using them.. Several manufacturers use 3 Pin XLR's for 'DMX' This is not standard. It may be worth having several jumpers to convert between these (and to isolate the second data link).

Splitting a DMX feed

You cannot split a DMX feed by simply soldering 3 cables together. Doing this may work some of the time but it cannot be relied upon. Most DMX compatible equipment has a DMX out socket fitted and this may be used to loop into other equipment. If you need to split a DMX feed a splitter box can be used (see the Compulite pages) These can also provide isolation such that a fault on one line does not cause a malfunction on the other line. An opto isolator is highly recommended on lines feeding dimmers as a fault could destroy other equipment on the line. Note that a line from an isolated port is considered to be a new DMX line.

The EIA 485 standard supports a maximum of 32 devices on a line. If more are needed a repeater is needed. This will allow another 32 devices to be added for a total of 63 devices (The repeater counts as a device). This can be continued for more devices. However where large networks are required it is better to use a splitter to produce multiple lines at the source. This means that if one line fails the problem will be limited to that section.

It is also worth noting that not all instruments have "proper" RS-485 receivers in them. Some of the wiggly lights (early I-beams?) simply stuck the LED in an opto-isolator across the DMX line, rather than a real receiver. This is OK, as long as you are only driving ONE thing from the line, and the line isn't too long. I think these things daisy-chained, with each light regenerating the signal for the next instrument.

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