

UNDERSTANDING - DMX 512

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DIGITAL MULTIPLEX

Multiplexing is a technology whereby many different electronic signals are combined through the modulation of a single carrier wave. An example of analog multiplexing is the telephone system.

DMX stands for *Digital Multiplex*. Currently, up to 512 individual digital control channels to be combined and carried along a single DMX cable connection. This has greatly reduced the cabling necessary to control complex lighting fixtures and systems. Like a telephone system, a single cable leaves the controller and connects to each fixture in a continuous daisy chain. Each fixture has its own unique address (phone number) so that it knows exactly when the controller is talking to it. All signals intended for different addresses (phone numbers) are ignored.

HOW COMPLICATED IS DMX 512 ?

DMX itself is not complicated, but confusion arises from the many different ways in which light fixtures and controllers make use of this control system.

As mentioned above a single DMX link provides up to 512 channels for control. However, a unique channel is required for each function of a light you wish to control. If you have a fixture that performs many different functions it will require multiple DMX channels.

Not all DMX controllers are built to include 512 DMX channels. Some may offer only 256 or even fewer channels. Many will also reserve a predetermined number of channels for each fixture (address) to be connected. This may limit the actual number of fixtures you can use with a particular controller.

For example, if your controller offers 256 channels and reserves 8 channels for each light fixture (address) then you can connect and control up to 32 unique fixtures.

$$256 \text{ chan.} \div 8 \text{ chan./fixture} = 32 \text{ fixtures}$$

WHAT IS A DMX ADDRESS?

Intelligent fixtures can perform multiple functions and usually require a number of sequential control channels. DMX provides up to 512 channels, so for each fixture we need to identify which of those 512 channels will be used.

A DMX address indicates the starting channel for control of that fixture. If your first fixture has a start address of 1 and uses 8 channels, your next fixture must have a start address of 9 or greater to prevent a conflict.

When using DMX it is more practical to refer to "addresses" rather than individual lighting fixtures since any two or more fixtures may share a single address.

Using our telephone analogy again we know that when someone dials your phone number (address) all the phones in your house ring together.

DMX operates in much the same way such that any two or more fixtures sharing the same address will operate in perfect synchronization (assuming they are compatible fixtures). Now you can see how the answer in our previous formula changes from **32 fixtures** to *any number of fixtures at 32 addresses*.

HOW DO I KNOW IF TWO FIXTURES CAN WORK TOGETHER ON THE SAME ADDRESS?

In order for two or more fixtures to operate together in perfect sync on the same DMX address each must have an identical control channel sequence.

For example, if one fixture requires 4 DMX channels, and the first channel controls color, then each subsequent fixture connected at that address must also use the first channel for color. The function for each remaining channel in use must also coincide.

	Chan 1	Chan 2	Chan 3	Chan 4
Fixture 1	Color	Gobo	X-motion	Y-motion
Fixture 2	Color	Gobo	X-motion	Y-motion

Check the fixture's owner manual to determine how many DMX channels are required, and how those channels are assigned to each function.

SOFT PATCHING & DEDICATED CONTROLLERS

When a 4 channel fixture is used with a controller that reserves 14 channels per address, the remaining 10 channels are unused. Some controllers allow you to make use of these unused channels through a function known as *soft patching*. See your owner manual for details.

Some inexpensive controllers are designed to run only one type or brand of DMX fixture. These controllers generally reserve only the number of channels required by the corresponding fixture, and provide specific limited control of that fixture's parameters.

HOW DO I SET UP MY DMX SYSTEM?

DMX control cables use a 3 or 5 pin microphone connector and should originate at the controller and link in a daisy chain fashion to each fixture on the system. The order of the fixtures in the link does not matter since each will respond only to commands directed at its assigned address.

The end of the control link should be terminated after the last fixture to prevent signal errors.