Beyond the dimmer: automated lighting control

Building up from the basics, **John Black** looks into the elements of an automated lighting system

IT SEEMS DIFFICULT TO FIND a lighting rig consisting solely of conventional fixtures these days – at least that seems to be the case in facilities around me here in Seoul. It doesn't matter if the event is a touring musical, a locally produced drama, a small concert, or a worship service – lighting consoles are controlling a variety of devices beyond the standard dimmer and conventional fixture.

While the effects achieved and possibilities of automated lighting may seem daunting at first, lighting consoles today have been designed to make controlling these fixtures a breeze. Once you have some background knowledge of how to integrate these fixtures into your rig and how your particular console communicates and allows you to control the device, you will be able to let your creativity flow and utilise these powerful tools to create the looks that you want.

System setup

Let's take a quick step backwards. In a simple, modern lighting system, there are three main components: conventional fixtures, dimmers (power distribution) and the control console. These three components are cabled together as is shown in diagram 1. The cabling between the dimmers and fixtures carries only AC power – there is no data being transmitted to the fixtures themselves. A data control signal is carried over a cable connection between the control console and the dimmers. As you can see, there is only one cable between components.

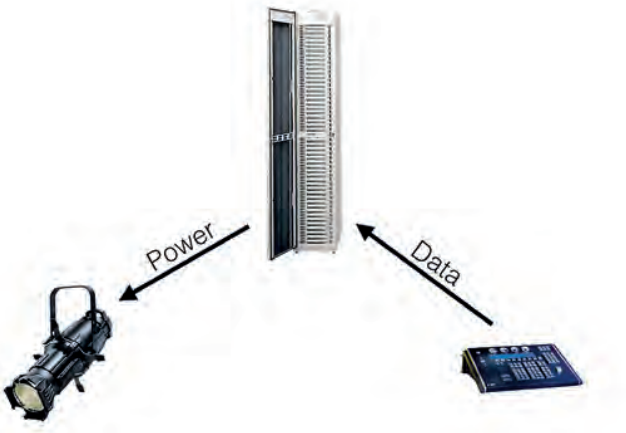


Diagram 1 The simplest automated lighting scheme

Automated fixtures, however, require a data connection in order to control all of the electronic and electromechanical systems housed in the fixture. These fixtures therefore require two cables to be connected – one for data (control) and one for power. This data distribution is the fourth component in the lighting system, as is shown in diagram 2.

Fixture power

Unlike conventional fixtures, whose brightness is controlled by increasing or decreasing voltage applied to the lamp, automated fixtures require a constant power source. The changing voltage of a dimmer would be damaging to the electronic and electromechanical systems in the fixtures. For this reason, automated lighting fixtures should not be connected to the standard dimmers in your dimming system used for conventional fixtures.

There are a number of options for getting constant power to your automated fixtures. If your facility has a well distributed dimming system, it

MEET THE AUTHOR

John Black, theatre manager for Seoul Foreign School

John Black serves as the theatre manager for Seoul Foreign School in Seoul, South Korea. Holding a degree in Theatre Design, he provides technical production support and design in three state-of-the-art performance venues on campus for over 40 major concerts and productions a year in the areas of sound, lighting, video and staging. John especially enjoys sharing his passion for entertainment technology with high school students each year through his student production team, *Crusader Live!*, giving students the opportunity to learn and work with professional-level technologies in a demanding production environment.

Diagram 2 For greater control, data must reach the lights as well as power

may be possible to change a dimming module for certain circuits with a constant current module. A constant current module allows the dimmer racks' power supply line voltage to pass through the system wiring to the connected devices independent of the control consoles' data signal. In my facilities, I have ETC Sensor3 dimming racks installed with a very good distribution of circuits around the facility. When I want to power an automated fixture in a particular location, I will replace one of the dimming modules with a constant current module that will pass power to the particular circuit the automated fixture is plugged into.

Another option for getting constant power to your automated fixtures is to set up and use a power distribution panel. The panel will be connected to a main disconnect switch through feeder cables, and then features a distribution panel that allows you to run power cables to the locations in which your fixtures will be situated. This method is common in temporary system setups, and as it requires connecting the distribution panel to high voltage supply switches, this system should only be set up and managed by qualified personnel.

As automated fixtures have been becoming more power efficient, and especially with the integration of LED lamp sources, some models now feature the ability to daisy-chain power from fixture to fixture, which decreases the number of power lines you will need to run from a power distribution panel, or the number of constant current modules you need if powering through your installed dimmer distribution system.

John Black's ETC Sensor3 dimming racks

Fixture data

In addition to power, you will need to run a data line to each automated fixture in your rig. The data signal has the ability to be daisy-chained from fixture to fixture (up to 32 fixtures), so you will probably only need to run a data line from the data distribution system to each location where automated fixtures are used. For example, one of the theatres that I work in has 10 data connector boxes permanently installed around the facility as part of the data distribution system. From those connector boxes, I can daisy-chain the data signal along all of the fixtures hanging on the pipe or truss in each location.

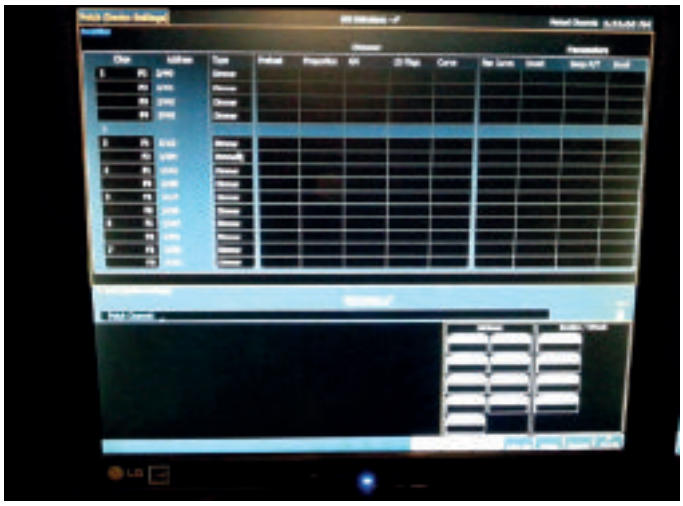
The control data that lighting systems utilise is a standard called DMX512. In today's networked world, many manufacturers have developed their own native protocols, such as ETCNet, ArtNet, HogNet or ShowNet that allow control data to be sent over networks using Ethernet. These protocols convert control data to or

ETC's ECC15 constant current module

from DMX512. Many control consoles still feature DMX512 outputs installed locally and for the purposes of this article, I will assume that that is the output to your data distribution system.

To get the control data to all of the locations where you may be using automated fixtures, you may need to use a DMX splitter. This device takes a single DMX input and transmits it across a number of outputs, which allows you to run data directly to multiple locations. Each DMX port from your console can communicate up to 512 DMX addresses (hence DMX512). If your rig consists of a lot of automated fixtures and other devices using DMX control, you may need to use multiple 'universes' of DMX, which often means using the second DMX port (or more) on the back of your console.

Lighting consoles can control a variety of devices beyond the standard dimmer and conventional fixture



You need to patch the fixtures so that you can control their features

Fixture patch

Once your automated fixtures have power and data from your control system, the next step is to patch the fixtures so that you can control their features. Most, if not all, lighting consoles today have integrated fixture libraries into their software to ease the process of patching. Unlike patching a dimmer, which uses only one DMX address, automated lights use an address for each controllable feature of the fixture.

For example, I have a number of PR Lighting XL700 fixtures in my inventory, each of which is controlled by 26 DMX addresses. When I go to patch, the console fixture library is programmed to already know what each address controls on the fixture so that I don't have to manually patch each address for each feature of every fixture in my rig. All that I have to do is know the starting DMX address of the fixture, select the fixture type, and assign that address to a control channel on the lighting console.

It is important to ensure that when setting up your automated fixtures, you have properly assigned their starting DMX addresses. Within the menu of the fixture itself, you will be able to choose this address. If your fixture uses 20 DMX addresses, your first fixture may be assigned DMX address 1, your second fixture DMX address 21, and so on. If you miscalculate and assign a fixture a DMX address in the control range of another fixture, your lighting console should warn you, but if you complete the patch, you will notice erratic behaviour of the fixtures.

The Pathport Octo DMX Splitter from Pathway Connectivity

Fixture control

Now that your fixtures have power, data and are patched, you can finally begin to take control. Keep in mind that all of the different manufacturers of lighting consoles have both GUI and operational differences.

The first thing you will need to do is turn on the lamp in the fixture. Most automated fixtures dim through the use of a mechanical shutter, which means that the lamp itself is always in the on-state or off-state. Thankfully it's possible to control this through the lighting console and you don't have to physically go to each fixture in your rig and turn on the lamp. In my facilities, I am using ETC Eos-based consoles. When I select a control channel for a fixture, I can navigate to 'Lamp Controls' where I then have the ability to turn on and off the fixture lamp.

Once the lamp is on, you will then be able to see the output of the fixture. Most lighting consoles make controlling all of the fixture systems easy through carefully designed interfaces, displays, buttons, wheels or any combination thereof.

For example, you may use a trackball to control the pan and tilt of the fixture in a natural, intuitive way. When wanting to mix colours using CMY colour filters, your console may bring up a colour gradient display that you can interact with using a stylus, mouse or finger to select a colour. In this case, the console interprets your selection and sends data to the fixture to move the CMY filters into the light beam such that that colour value is projected.

As you explore the many features of these fixtures, you may wonder how to control everything for a number of fixtures during a live event. I encourage you to look back through the *How to Use a Lighting Desk* series in the four 2015 *Worship AVL* issues, as all of the concepts pertaining to programming fixture groups, palettes, submasters and cues will assist you in storing and recalling all of the information for lighting fixtures – both conventional and automated. As you become more comfortable with controlling the fixtures individually, experiment with your consoles' effects generator to create more complicated movements and effects. With just a basic understanding of the features of your specific automated fixtures and how to operate your console, your creativity will be your only limit.

An Avolites Titan Mobile control surface and software manages the lighting at GBI Gilgal

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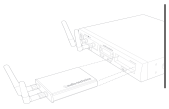

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