DIVINE ATTRIBUTION

The story starts with the digital dimmer protocol DMX512. This is the standard signal, adopted worldwide, for lighting consoles to communicate information to dimmers. The intensity level for each dimmer is sent as a digital code; for the technically-minded it's a single 8-bit byte (an 8-digit binary number) for each dimmer. Eight bits provides 256 unique levels from off (0) to full intensity (255), and over the years, memory lighting consoles have been developing with a seemingly relentless catalogue of sophisticated features to enable the 256 steps to be manipulated, stored, combined, arbitrated and sent to the dimmers to create a wealth of different lighting effects.

An agreed international protocol is an exciting concept. It unlocks previously untapped innovation, bringing new opportunities to the growing numbers of people with DMX control systems. Colour changers have been available almost as long as artificial light itself, but with a DMX console, remote control of colour is as simple as extending the DMX data cable to each unit in turn, and setting a DMX 'address' on each unit. The ubiquitous scanners, such as the Strand Hyperbeam, with their high intensity discharge sources, dichroic colour mixing, beam diverting mirror, gobos and prism effects are also controlled by multiple DMX signals. Effects projectors are also available with DMX, as are smoke machines. As the use of the dimming signals for other applications increases, a new term is required to describe them, for as we shall see later, the concept of fading up and down doesn't really match the movement of a mirror, or the choice of a gobo. The term used for the other, non-dimming, uses of DMX signals is "attributes".

Let's first look at what the "attribute" DMX signals mean practically. Inset is an example of how a Hyperbeam captures a block of DMX signals, and uses the 'dimmer' levels to represent the position of the beam, the colour, a gobo position etc. Each DMX cable can transmit 512 individual DMX levels; each level has a unique address number. During the setting up procedure, the Hyperbeam is given a 'start address'. This DMX address begins a sequence of 17 addresses, and each level is used for one function of the luminaire.

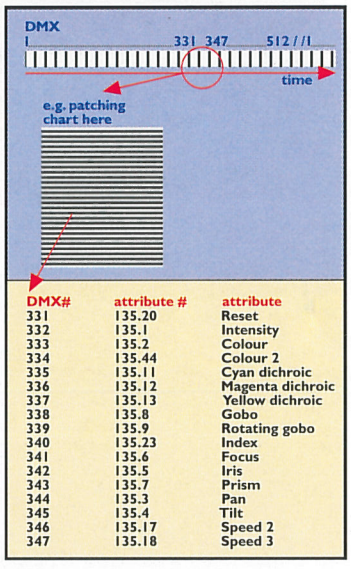
As the DMX signal increases from zero, which would normally define the off level for a light connected to a dimmer, the function to which it refers alters proportionally to the DMX level. For example, the mirror's pan movement will move from one extreme to the other as the DMX level changes from zero to 255 in unit steps - zero, and it points left, 128 and it is in the centre, 255 and it points to the right. Similarly, the other attributes' positions are related to a proportion of the 256 steps in the DMX signal.

Unfortunately, the relationship between DMX signals and the individual attributes of various scanners is far from consistent. Different units have a variety of types of attribute, and even when the attributes are similar between units, the implementation of the DMX control depends on the product designer's individual preferences. So inevitably there is a patch, a sort of telephone exchange, linking a DMX number with a particular attribute. With Tracker software for the new consoles, the Strand 430, 530 and 550, a library of twelve of the world's most popular automated units is provided to simplify the patching process. Only the start DMX address and Strand's library reference number for the chosen unit are needed to patch all the attributes in the correct order.

Although the current batch of scanners available today use fewer than 25 attributes in total, Tracker software, and the operating software with which it integrates (GeniusPlus and Lightpalette) have a wider vision of the future, and will accommodate up to 99 attributes per control channel, including the intensity. This concept of having attributes linked to a channel is where the real advancement in the new generation of memory controls can be experienced.

With a conventional DMX lighting console each attribute function, such as pan, tilt and colour requires individual and direct control, and this is achieved by patching a control channel to each DMX output. For a Hyperbeam scanner not only are we using 17 DMX signals to control all the functions, we also require 17 channel numbers to be allocated too. With a relatively modest complement of ten such units, a colossal 170 channels of the memory system's capacity is allocated to them.

Then the operational problems begin; remembering which channel numbers are the dowser of unit number 6, the colour of unit 3 and the pan movement of number 10 requires the memory of an elephant,



DMX#	attribute #	attribute
331	135.20	Reset
332	135.1	Intensity
333	135.2	Colour
334	135.44	Colour 2
335	135.11	Cyan dichroic
336	135.12	Magenta dichroic
337	135.13	Yellow dichroic
338	135.8	Gobo
339	135.9	Rotating gobo
340	135.23	Index
341	135.6	Focus
342	135.5	Iris
343	135.7	Prism
344	135.3	Pan
345	135.4	Tilt
346	135.17	Speed 2
347	135.18	Speed 3

A Hyperbeam 1288, controlled by channel 135, with a DMX start address of 331.

or a huge cross-reference sheet. Then there's the question of recording and performing the multi-attribute changes; if the console works on a 'preset' principle where each memory is a unique record of all the DMX levels, rather than a 'tracking' console (like Lightpalette 90 and Galaxy Nova, which are able to record only changes), the change from one memory to another can force all attributes to reset to their zero level, particularly if the cue calls for a blackout.

The Strand 430, 530 and 550 consoles bring a fresh approach to solving these problems. Each channel number in the system is capable of controlling a total of 99 individual attributes. The trick is that each unique channel number is in fact a two decimal place number, but the decimals are hidden from the user (unless specifically needed). Thus the operator types 33, and controls all attributes simultaneously, but the console understands this as channel 33.01 (intensity, on the wheel), 33.02 (colour on a rotary encoder), 33.03 (pan on the trackerball), 33.04 (tilt, trackerball), 33.05 (cyan dichroic, rotary), 33.06 (magenta dichroic, rotary) etc. The advantage is immediate; access to all attributes of a particular unit through the use of a single channel number. The new Strand consoles are equipped with 4 additional flat rotary encoder wheels, where the top wheel is always colour, and the remaining three can be scrolled through the attribute list to control three chosen functions at a time.

An added benefit to this scheme is that the software can recognise the difference between an intensity (it's always entered as a whole number or as a 'point 1'), and an attribute (point 2 to point 99). The difference is vital in memory system architecture. The intensity of light can be controlled from a variety of sources, the channel control, the playbacks, a group of submasters to name three. If the same channel exists in a variety of locations, the console arbitrates and outputs either the highest level (known as 'Highest level Takes Precedence' or HTP), or the latest change (known as 'Latest action Takes Precedence', or LTP). With attributes, the concept of the highest level (HTP) isn't logical when controlling a colour scroller, for example, as which is the highest between blue and pink? However, the idea of the latest colour chosen, blue, followed by pink (LTP) is understandable for the operator and the computer. Thus the software differentiates between the attribute which may be both HTP'd or LTP'd (intensity only), and those which may be LTP'd only (position, colour, gobo etc); in fact, this group contains everything except intensity. With this difference defined, the console can then treat the attributes differently, and this is the crux of the system - only intensities take part in fades to zero, attributes change only to a new position when specifically instructed.

But this is not the end of the story. Individual attributes can be controlled by entering the decimal point number directly on the keyboard, and if submasters are used with attribute channels, some exciting options exist. For example, if the submaster includes a selection of attribute channels, with their intensity levels defined, the console will perform a change to the new look when the submaster fader is moved to full. However, if the submaster includes only one attribute for its group of channels (e.g. pan, or tilt, or colour) the submaster will manually control the attribute live.

The control of multi-attribute luminaires has been made more elegant, and simpler for the Strand console operator by some basic lateral thinking by our software design team, the use of decimal channel numbers, and Tracker software.