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Ultamation DMX Controller Profile

Revision: 1.03
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Notes

This document describes the interface profile for the DMX controller. The profile defines the parameters and supported features that should be used in conjunction with the generic protocol document.

Addressing

The DMX Controller is addressed at 0x0000.
This provides access to the individual channel data and the 8 "live" pattern generators.

Controller Parameters (Address 0x0000)

Parameter Definition

Param	Description	Type	R/W/F
0x0001	DMX Channel 1	n*(ASCII HEX 2)	R/W
..			
0x0200	DMX Channel 512	n*(ASCII HEX 2)	R/W
		Read request take a single ASCII HEX 4 value to indicate how many channels to return	
Special Functions			
0x1000	Channel Fill Any data that overwrites a running pattern will result in that pattern being stopped.	ASCII HEX 4 start ASCII HEX 4 end n*(ASCII HEX 2) Channel data to repeat	W
0x1001	Set Clock	3*HEX 2 "HHMMSS"	R/W
0x1002	Set Clock Offset	ToDo!	
0x1012	Read and return pattern from NVRAM	See detail	R/W
Pattern Generators			
0x1100-0x11FF	Pattern Generator 1 (see detail below)		
0x1200-0x12FF	Pattern Generator 2		
0x1300-0x13FF	Pattern Generator 3		
0x1400-0x14FF	Pattern Generator 4		
0x1500-0x15FF	Pattern Generator 5		
0x1600-0x16FF	Pattern Generator 6		
0x1700-0x17FF	Pattern Generator 7		

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Pattern Generator Definitions

Param	Description	Type	R/W/F
0x1p01	Run/Stop	ASCII BOOL	R/W
0x1p02	Name (15 char max)	STRING	R/W
0x1p03	Rate (signed)	ASCII HEX 4	R/W
0x1p04	Channel Start/End/Step (1 base)	2*(ASCII HEX 4)+ASCII HEX 2	R/W
0x1p05	Pattern Span	ASCII HEX 4	R/W
0x1p06	Sequence Step Count	ASCII HEX 4	R/W
0x1p07	Sequence Relative Position	ASCII HEX 4	R/W
0x1p08	Snap Mode	ASCII BOOL	R/W
0x1p09	Bounce Mode Buggy in normal mode Works in clock mode	ASCII BOOL	R/W
0x1p0A	Sequence Channel 1 Data (e.g. Red)	n*(ASCII HEX 2)	R/W
0x1p0B	Sequence Channel 2 Data (e.g. Green)	n*(ASCII HEX 2)	R/W
0x1p0C	Sequence Channel 3 Data (e.g. Blue)	n*(ASCII HEX 2)	R/W
0x1p0D	Overlay Operation	See below	R/W
0x1p0E	One Shot Mode Not yet implemented	ASCII BOOL	R/W
0x1p0F	Load Pattern from NVRAM (Pattern Store Slot 1-255) and optional Run, Stop or leave unchanged. A further optional parameter allows the channel start, end and step parameters to be overridden.	ASCII HEX 2 [CHAR 'R'|'S'|'U'] [ASCII HEX 4 ASCII HEX 4 ASCII HEX 2]	W
0x1p10	Store Pattern to NVRAM	ASCII HEX 2 (Slot)	W
0x1p11	Stop Pattern and set all channels to '0'	n/a	W
0x1p12	Read/Write Complete Pattern	See detail	R/W

Where p=pattern number

ASCII BOOL   '0' or '1'
ASCII HEX 2   '00' – 'FF'
ASCII HEX 4   '0000' – 'FFFF'

Fixture Channel Format:
First 4 hex chars: The base channel of the first "fixture" (1 base)
Next 4 hex chars: The end channel of the last "fixture" (1 base, and calculated as follows:
End = start + (fixtures x step) - 1
Next 2 hex chars: The channel steps between fixtures (normally 3)

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Overlay operations take the current state of the channel data, and apply the pattern to this data via the selected operation.

Valid Overlay Operations are:
- NON – No operation
- IOR – Inclusive Bitwise Or
- AND – Bitwise And
- XOR – Exclusive Bitwise Or
- ADD – addition (clamped at max 255)
- SUB – subtraction (clamped at min 0)
- MIN – the min of the current channel values against the current dmx data
- MAX – the max of the current channel values against the current dmx data
- SCL – scales the three RGB channels DOWN (i.e. 255 = unchanged, 128 = 50%)
- CLK – runs an analog clock function – see explanation below
- FAD – runs a special "fade" pattern – see explanation below

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CLK Overlay Mode

This is a pattern generator special "Novelty" mode that produces a clock pattern across a number of RGB channel groups.

In this mode, the pattern generator configuration is slightly non-standard, as follows:

The clock is represented by three colours, one for each of Hours, Minutes and Seconds. These colours are defined by the first three steps in the pattern generator table. If one of the hands is not desired (say you don't want the seconds hand to be displayed) then this step can be set to "black" (RGB 0,0,0) and it will not play a part in the clock representation.

The fourth step can be used to set a background colour for the clock face when the bounce mode is set OFF.

Bounce mode has a special meaning in the clock, and is used instead to determine if the clock should use the "Step 4" RGB values as a clock face base (when OFF), or overlay the hands on top of the lower patterns using the MAX operation (when ON).

Span determines the spread of each "hand". If set to 1, the hand will only span a single fixture. If set to higher values, the hand will have a wider spread and the number of fixtures specified.

Snap will set the clock to "jump" between seconds, minutes and hours when ON. When off, the "hands" will sweep between positions.

Fade Mode

This is a special pattern to allow smooth transitions across a range of channels to a new setting.

When started (run mode command, recall from preset, etc.) the position will be set to '0', and the pattern generator activated.

The Rate parameter will determine the fade time (TBD – at 40 frames per second, we need to work out how the rate maps onto "normal time". E.g. Rate (in milliseconds) = 1000 = 1 second fade.

The channels selected will move from their current values to the pattern (determined by the steps, span, colour values) for the duration determined by rate.

Once the fade is complete, the pattern generator will be disabled, as in a one shot mode.

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Read/Write pattern definition from/to NVRAM (0x100F)

When reading a pattern, the message will take the following form (using the GET command):

Char(s)	Description	Type
00	Pattern Slot (1-255)	ASCII HEX 2

And will return

Char(s)	Description	Type
00	Pattern Slot (1-255)	ASCII HEX 2
02-17	Pattern name (null padded, max 16)	STRING[16]
18	Run on/off	ASCII BOOL
19	Snap on/off	ASCII BOOL
20	Bounce on/off	ASCII BOOL
21	One Shot on/off	ASCII BOOL
22-25	Rate	ASCII HEX 4
26-29	Position	ASCII HEX 4
30-33	Channel Start (1-512)	ASCII HEX 4
34-37	Channel End (1-512)	ASCII HEX 4
38-39	Channel Step (1-255)	ASCII HEX 2
40-42	Overlay/Pattern Operation	STRING[3]
43-44	Span	ASCII HEX 2
45-46	Steps	ASCII HEX 2
47-78	Step data (Ch1)	16*ASCII HEX 2
79-110	Step data (Ch2)	16*ASCII HEX 2
111-142	Step data (Ch3)	16*ASCII HEX 2
143	Pattern is valid	ASCII BOOL

When writing the pattern, the return form (as above) should be issued using the SET command, and the "Valid" Boolean is optional and ignored. The board will respond with acknowledge.