

Chapter 5: DMX Programming

You can program SHAPESHIFTER fixtures in terms of color, intensity, and timing and can position the LED modules to form single or multiple beams. This chapter gives a brief overview of DMX programming and describes the parameters.

DMX Programming Overview

A parameter is a fixture attribute that can be controlled to modify the light beam in terms of color, beam quality and pattern, intensity, or focus (position). DMX programming assigns a DMX value to each of the fixture's parameters. A *scene* is one combination of parameter settings. Scenes are the building blocks for show creation.

Full Speed versus MSpeed Control

Some parameters can be set to operate at full speed or MSpeed (motor speed). Full speed operations are completed in the shortest length of time after the motor starts moving. With MSpeed control, change occurs smoothly over the entire MSpeed time value selected. For example, if you select an MSpeed time of 30 seconds, the motor will gradually change position until it reaches its new destination at the end of 30 seconds. SHAPESHIFTER fixtures allow optional MSpeed control for pan and tilt movement parameters.

16-bit Functionality

Several parameters use two channels to provide 16-bit control for very fine adjustment capabilities.

DMX Programming Options

Using a DMX controller, you can program an unlimited number of looks and retain direct control over the SHAPESHIFTER fixture at all times. SHAPESHIFTER fixtures also allow Preset programming through the fixture menu system, see *Chapter 5: Preset Programming* on page 47.

Programming with a DMX Console

Hog[®] 4, Road Hog[®] 4, Full Boar 4, and Hedge Hog lighting consoles; and Hog[®] 4PC software are available from High End Systems to control SHAPESHIFTER fixtures (see *Related Products and Accessories* on page 5). For information on whether your DMX controller supports SHAPESHIFTER fixtures, contact the controller's vendor. For information on operating your fixture with a controller (or control device such as DMX control software), consult the documentation provided with the controller.

SHAPESHIFTER DMX Protocol Options

Both SHAPESHIFTER C1 and M1 models have Reduced and Enhanced protocol options.

The Reduced Protocol option uses 28 channels of a standard DMX512 link to control Position, Color mixing, Module movement, Macros, Dimming, Shutter, MSpeed, and the Indigo Highlighter system. All modules are controlled as a unit. SHAPESHIFTER W1 models have all white LEDs so color mixing functions actually refer to changes in the “white” intensity for groups of LEDs on an LED module.

In addition to all the functions of the Reduced protocol, Enhanced protocol mode adds individual control of each of the seven LED modules.

Reduced Protocol Mode

SHAPESHIFTER CI Reduced Protocol

Chan	Function	Chan	Function	Chan	Function
1	Pan	11	Dim	21	LED Intensity Macro Speed
2		12		22	LED Intensity Macro XFade
3	Tilt	13	MSpeed	23	Control
4		14	Inclusive Macro	24	Indigo Highlighter Function
5	Master LED Function	15	Inclusive Macro Speed	25	Indigo Highlighter Dim
6	LED X	16	Inclusive Macro X Fade	26	LED Red
7	LED y	17	LED XY Macro	27	LED Green
8	Mix Color Function	18	LED XY Macro Speed	28	LED Blue
9	Shutter/LED Functions	19	LED XY Macro XFade		
10	Shutter	20	LED Intensity Macro		

SHAPESHIFTER WI Reduced Protocol

Chan	Function	Chan	Function	Chan	Function
1	Pan	11	Dim	21	LED Intensity Macro Speed
2		12		22	LED Intensity Macro XFade
3	Tilt	13	MSpeed	23	Control
4		14	Inclusive Macro	24	Indigo Highlighter Function
5	Master LED Function	15	Inclusive Macro Speed	25	Indigo Highlighter Dim
6	LED X	16	Inclusive Macro X Fade	26	LED White 1
7	LED y	17	LED XY Macro	27	LED White 2
8	Mix Color Function	18	LED XY Macro Speed	28	LED White 3
9	Shutter/LED Functions	19	LED XY Macro XFade		
10	Shutter	20	LED Intensity Macro		

Enhanced Protocol Mode

SHAPESHIFTER CI Enhanced Protocol

Chan	Function	Chan	Function	Chan	Function	
1	Pan	27	LED1 Green	53	LED4 Function	
2		28	LED1 Blue	54	LED4 Dim	
3	Tilt	29	LED1 Function	55		
4		30	LED1 Dim	56	LED5 X	
5	Master LED Function	31		32	LED2 X	57
6	LED X	32	LED2 X	58	LED5 Red	
7	LED y	33	LED2 Y	59	LED5 Green	
8	Mix Color Function	34	LED2 Red	60	LED5 Blue	
9	Shutter/LED Functions	35	LED2 Green	61	LED5 Function	
10	Shutter	36	LED2 Blue	62	LED5 Dim	
11	Dim	37	LED2 Function	63		
12		38	LED2 Dim	64	LED6 X	
13	MSpeed	39		40	LED3 X	65
14	Inclusive Macro	40	LED3 X	66	LED6 Red	
15	Inclusive Macro Speed	41	LED3 Y	67	LED6 Green	
16	Inclusive Macro X Fade	42	LED3 Red	68	LED6 Blue	
17	LED XY Macro	43	LED3 Green	69	LED6 Function	
18	LED XY Macro Speed	44	LED3 Blue	70	LED6 Dim	
19	LED XY Macro XFade	45	LED3 Function	71		
20	LED Intensity Macro	46	LED3 Dim	72	LED7 X	
21	LED Intensity Macro Speed	47		73	LED7 Y	
22	LED Intensity Macro XFade	48	LED4 X	74	LED7 Red	
23	Control	49	LED4 Y	75	LED7 Green	
24	Indigo Highlighter Function	50	LED4 Red	76	LED7 Blue	
25	Indigo Highlighter Dim	51	LED4 Green	77	LED7 Function	
26	LED1 Red	52	LED4 Blue	78	LED7 Dim	
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SHAPESHIFTER WI

Chan	Function	Chan	Function	Chan	Function
1	Pan	27	LED1 White 2	53	LED4 Function
2		28	LED1 White 3	54	LED4 Dim
3	Tilt	29	LED1 Function	55	
4		30	LED1 Dim	56	LED5 X
5	Master LED X/Y Function	31		57	LED5 Y
6	LED X	32	LED2 X	58	LED5 White 1
7	LED y	33	LED2 Y	59	LED5 White 2
8	Mix Color Function	34	LED2 White 1	60	LED5 White 3
9	Shutter/LED Functions	35	LED2 White 2	61	LED5 Function
10	Shutter	36	LED2 White 3	62	LED5 Dim
11	Dim	37	LED2 Function	63	
12		38	LED2 Dim	64	LED6 X
13	MSpeed	39		65	LED6 Y
14	Inclusive Macro	40	LED3 X	66	LED6 White 1
15	Inclusive Macro Speed	41	LED3 Y	67	LED6 White 2
16	Inclusive Macro X Fade	42	LED3 White 1	68	LED6 White 3
17	LED XY Macro	43	LED3 White 1	69	LED6 Function
18	LED XY Macro Speed	44	LED3 White 3	70	LED6 Dim
19	LED XY Macro XFade	45	LED3 Function	71	
20	LED Intensity Macro	46	LED3 Dim	72	LED7 X
21	LED Intensity Macro Speed	47		73	LED7 Y
22	LED Intensity Macro XFade	48	LED4 X	74	LED7 White 1
23	Control	49	LED4 Y	75	LED7 White 2
24	Indigo Highlighter Function	50	LED4 White 1	76	LED7 White 3
25	Indigo Highlighter Dim	51	LED4 White 2	77	LED7 Function
26	LED1 White 1	52	LED4 White 3	78	LED7 Dim
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Parameter Descriptions

Individual parameters are described in the following sections.

Note: All DMX values indicated in the detailed parameter descriptions are in decimal units.

Positioning Parameters

Fixture Pan and Tilt

The SHAPESHIFTER fixture has a 630° pan range and a 270° tilt range. Two DMX channels provide 16-bit adjustment to a fraction of a degree for pan and tilt position.

An MSpeed function is available for **Pan** and **Tilt** parameters when the MSpeed parameter. For information on implementing MSpeed, see *MSpeed (Motor Speed)* on page 41.

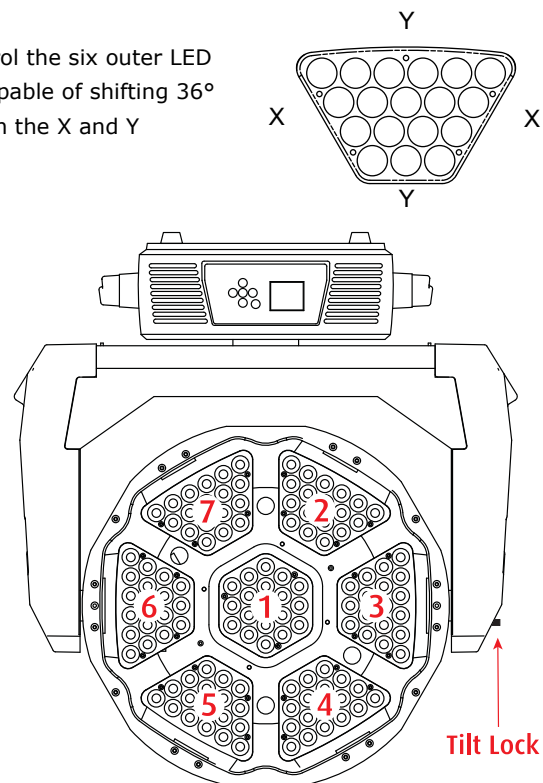
Note: Optical encoders for pan and tilt instantly correct the fixture's position if the fixture is jarred from its programmed position. If a physical obstruction prevents the fixture from correcting its position, the fixture "times out" to prevent wear on the motors. If the fixture has timed out, remove the obstruction and home the fixture to return it to normal operation.

Module X and Y Position

In addition to fixture positioning, you can control the six outer LED modules' positioning. Each outer module is capable of shifting 36° (18° either side of the nominal position) in both the X and Y direction.

In Reduced protocol, the six outer modules are positioned as a unit. The **Master LED Function** channel allows you to enable all of the LED modules when the DMX value = 0-127 or disable the center Module when the DMX value = 128-187.

In Expanded protocol, the **Master LED X/Y Function** let's you enable X/Y positioning for all the modules as a unit with a DMX value = 0-127 or enable Independent X/Y Control with a DMX value = 128-187. With Independent X/Y control enabled, you set the module position using the **X** and **Y** parameters associated with each of the seven modules.

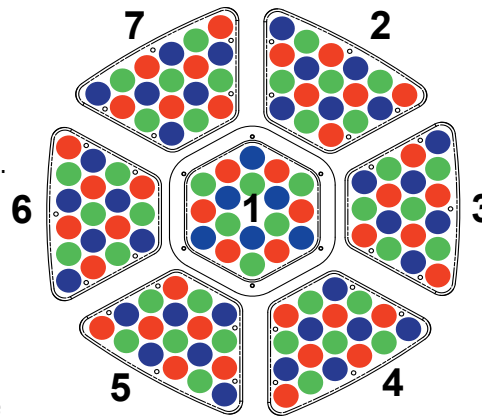


Color Parameters

Each Module of a SHAPESHIFTER fixture is composed of three groups of LEDs. In SHAPESHIFTER C1 fixtures, these are colored LEDs. When they are all set at the same intensity level, they project as white.

In SHAPESHIFTER W1 fixtures, the LEDs are still grouped but are all white.

The **LED Red**, **LED Green**, and **LED Blue** parameters control the saturation (brightness level) of each group of LEDs on a Module. Values for each color parameter range from **Off** when the DMX value = 0 to fully **On** when the DMX value = 255.



Reduced Protocol controls all the modules as a unit. For example, intensity set for one LED group will affect that group on each module.

Enhanced Protocol gives you control of each group of LEDs on a module independent of other modules.

The **Mix Color Function** parameter offers multiple options for controlling the LED color mixing and output. In Enhanced protocol mode, there is a **Mix Color Function** for each module.

Mix Color Function	DMX Value	Description
RGB	0-15	Mixes Red, Green and Blue
CMY	16-31	Mixes inverse of RGB . Red = Cyan, Green = Magenta, Blue = Yellow
Cycle	32-47	Cycles through all the colors. Red channel controls cycle speed from slow to fast
Random	48-63	Randomly selects color. Red channel controls intervals from slow to fast.

Shutter Parameters

Shutter Function

The **Shutter Function** parameter control normal shutter and strobing features.

Shutter Options	DMX Value	Description
Normal Shutter Functions	0-23	Opens and closes shutter flags in the optical path
Random Random Strobe	24-299	Strobes beam at random intervals
Synchronous Random Strobe	230-255	Synchronizes random strobing for all SHAPESHIFTER fixtures using the same DMX controller

Shutter

The **Shutter** parameter determines sets the strobing rate.

DMX Value	Shutter Parameter Options
0-23	Close shutter
24-229	Set strobe rate from slowest to fastest
230-255	Open shutter

Dim

SHAPESHIFTER fixtures provide 16-bit brightness control utilizing the **Dim Coarse** and **Dim Fine** parameters. The dim values range from Off at a DMX value = 0 to fully on when the DMX value = 255 for both parameters.

MSpeed (Motor Speed)

MSpeed is the time required for a motor to complete movement when changing from one position to another. In SHAPESHIFTER fixtures, MSpeed provides a means for Pan and Tilt motors to reach their target position at the same time, even though each motor may have different distances to travel. MSpeed movement is extremely smooth because the fixture controls movements independent of DMX refresh rates.

MSpeed times vary from 0.15 seconds to 252.7 seconds. However, when MSpeed is applied to a parameter, the delay value (length of time allowed for the entire scene) needs to be longer than the MSpeed value to allow the motors to complete their movement before the end of the scene. An MSpeed value that is longer than the delay value could produce an undesirable result; for example, no light output during the scene. For a listing of exact MSpeed times, see *Chapter A: MSpeed Conversion Table* on page 57.

Macros

SHAPESHIFTER fixtures provides factory programmed multi-step macros to create a variety of looks without extensive user programming. Three Macro types give you varying levels of control over the look.

Note: *Inclusive Macros and Intensity Macros are designed to work with the fixture in RGB mode on the Mix Color Function channel. XY Macros do not contain color data.*

Inclusive Macros

The **Inclusive Macro** parameter contains Intensity, RGB, and Module X/Y, Speed, and Crossfade data that operate independently. The user can scale up or down from the preprogrammed speed and crossfade time for the macro.

Inclusive Macro Speed and **Inclusive Macro XFade** parameters allow you to scale the programmed speed and crossfade values of an Inclusive Macro.

DMX Value	Macro Speed and Macro XFade Channel Function
0	Stops playback or crossfade
1-127	Decreases playback speed / crossfade time from the programmed rate
128	Playbacks or cross fades speed is as programmed
129-255	Increases playback speed / crossfade time from the programmed rate

Note: *Depending on the programmed speed or crossfade values of an individual Inclusive Macro, some Speed and XFade values may not have an effect on the output.*

LED X Y and LED Intensity Macros

For more control of the final look of the macro, you can combine other Macro types. The **LED X Y Macro** parameter contains Module X/Y data only. The **LED Intensity Macro** parameter contains RGB Intensity data only. Each of these Macro types uses dedicated channels to control macro **Speed** and **Crossfade** in the following way.

DMX Value	Speed and Macro XFade Channel Function for LED XY or LED Intensity Macros
0-3	Stops playback or crossfade
4	Slowest playback speed or crossfade time
4-254	Increases the playback speed or crossfade time
255	Fastest playback speed or crossfade time

Control

The **Control** parameter allows remote control of Display, Homing, Module Lamp and Shutdown.

Note: *To access all control settings, first select a control channel value, then set the Shutter channel to DMX = 0.*

Control Setting	DMX Value	Description
Safe	0-5	Disables all Control settings for normal operation
Pan and Tilt MSpeed Off	16-31	Disables MSpeed
Display/LEDs Off	32-47	Turns display and all LED modules off
Display/LEDs Bright	48-63	Turns display and all LED modules fully on
Home All	64-79	Remotely homes all the fixture components
Shutdown	80-95	Remotely shuts down the fixture. When a fixture is shut down, the LEDs are off and power to the motors is disabled. If a fixture is in shutdown mode, the fixture must be homed to bring it back into operation.
Module X Invert On	112-127	This menu option inverts the direction of the Module X motor operation to coordinate movements between SHAPESHIFTER fixtures mounted opposite each other horizontally.
Module X Invert Off	128-143	
Module Y Invert On	144-159	This menu option inverts the direction of the Module Y motor operation to coordinate movements between SHAPESHIFTER fixtures mounted opposite each other vertically.
Module Y Invert Off	160-175	
Module XY Swap On	175-191	These options swap the Module X and Y motor operation to coordinate movements between SHAPESHIFTER fixtures mounted perpendicular to each other
Module XY Swap Off	192-207	

Indigo Highlighter

Indigo Highlighter system consists four 1-watt indigo LEDs that provide additional light output. Two parameters define the Indigo Highlighter operation.

Indigo Highlighter Function

You can choose to have the Indigo Highlighter system function independently from the fixture's dimming or track it.

Indigo Highlighter Function	DMX Value	Description
Dim Tracking Mode		
Continuous	0-15	Tracks the fixture dimming with continuous output
Periodic Strobe	16-41	Tracks the fixture dimming with periodic strobing from slowest to fastest
Random Strobe	42-67	Tracks the fixture dimming with random strobing from slowest to fastest
Independent Tracking Mode		
Continuous	128-143	Continuous output independent from fixture dimming
Periodic Strobe	144-169	Periodic strobing output independent from fixture dimming from slowest to fastest
Random Strobe	170-195	Periodic strobing output independent from fixture dimming from slowest to fastest

Indigo Highlighter Dim

This parameter adjusts the Indigo Highlighter LEDs from **Off** at a DMX value of 0 to fully **On** at a DMX value of 255.