Appendix A:

Studio Command™ DMX Protocol

Studio Command 1200 Protocol

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
1	Pan	Pan, coarse adjustment	0-255	0-100	00-FF
2	Pan	Pan, fine adjustment	0-255	0-100	00-FF
3	Tilt	Tilt, coarse adjustment	0-255	0-100	00-FF
4	Tilt	Tilt, fine adjustment	0-255	0-100	00-FF
5	Color Function	*Full Speed Control*			
		Continuous	0-15	0-6	00-0F
		Cycle (Speed is set by the Cyan channel)	16-31	6-12	10-1F
		Random (Speed is set by the Cyan channel)	32-47	13-18	20-2F
		TBD	48-127	19-50	30-7F
		MSpeed Controlled			
		Continuous	128-143	50-56	80-8F
		Cycle (Speed is set by the Cyan channel)	144-159	57-62	90-9F
		Random (Speed is set by the Cyan channel)	160-175	63-69	A0-AF
		TBD	176-255	69-100	B0-FF
6	Cyan Wheel	*Continuous Mode. Absolute position across 360 degrees*			
		Cyan Full Saturation	0	0	00
		Open	255	100	FF
		Cycle & Random Modes (sets the rate for all color wheels when Color function parameter = 16-47)			
		Slow Rate	0	0	00
		Fast Rate	255	100	FF
7	Magenta Wheel	Magenta Full Saturation	0	0	00
		Open	255	100	FF
8	Yellow Wheel	Yellow Full Saturation	0	0	00
		Open	255	100	FF
9	Zoom	Zoom Narrow	0	0	00
		Zoom Wide	255	100	FF

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
10	Shutter Function	**Normal Shutter Functions** *(No lamp or dimming functions selected in Control channel)*			
		Close	0-23	0-9	00-17
		Periodic Strobe, Mechanical from 1-4Hz operation	24-27	9-10	18-1B
		Periodic Strobe, Electronic from 5-33Hz operation	28-49	11-19	1C-31
		Random Random Strobe	50-75	20-29	32-4B
		Synchronous Random Strobe	76-101	30-40	4C-65
		Open	102-255	41-100	66-FF
		Lamp Assisted Strobes *(Accessed when the Control channel range = 134-137)*			
		The shutter functions are the same as in the normal shutter function range. Periodic random random and random synchronous strobes are lamp assisted.			
		Lamp functions. *(Accessed when the Control channel range = 138-141)*			
		The shutter functions are the same as in the normal shutter function range. Periodic random random and random synchronous strobes are lamp assisted.			
		Lamp Dimming only. *(Accessed when the Control Channel range = 146-149)*			
		The shutter functions are the same as the normal shutter function range. Dimming is accomplished electronically, lowering the lamp power. Dimming will not go to black. Strobes are mechanical and will go to black.			
11	Dim	Close	0	0	00
		Open	255	100	FF
12	MSpeed	Disable	0-3	0-1	00-03
		Longest (252.7 sec.)	4	2	04
		Shortest (0.15 sec.)	255	100	FF
13	Macro Note 1)	Macro Off	0-5	0-2	00-05
		Pan sweep, small to large angle	6-62	2-24	06-3E
		Macro Off	63-65	25-25	3F-41
		Tilt sweep, small to large angle	66-122	26-48	42-7A
		Macro Off	123-125	48-49	7B-7D
		Clockwise circle, small to large	126-160	49-63	7E-A0
		Macro Off	161-163	63-64	A1-A3
		Counterclockwise circle, small to large	164-198	64-78	A4-C6
		Reserved	199-255	78-100	C7-FF

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
14	Control	*The Control channel should not be crossfaded.*			
		Safe (disables all Control settings)	0-9	0-4	00-09
		Pan & Tilt MSpeed Off	10-19	4-7	0A-13
		Set Shutter channel to 0 for access to the following commands.			
		Display Off	20-28	8-11	14-1C
		Display Dim	30-38	12-15	1E-26
		Display Bright	40-48	16-19	28-30
		Home	60-68	24-27	3C-44
		Lamp On	80-88	31-35	50-58
		Lamp Off	90-98	35-38	5A-62
		Shutdown *(send for 5 seconds)*	120-130	47-51	78-82
		Lamp Functions			
		Lamp assisted strobes (Periodic and Random strobe functions are lamp assisted. Ramp functions are not lamp assisted.)	134-137	53-54	86-89
		Lamp functions (modifies the shutter channel)	138-141	54-55	8A-8D
		Lamp/mechanical dimming (Lamp output will vary from a minimum to 1200 Watts as the mechanical dimming ranges from 0-100%)	142-145	56-57	8E-91
		Lamp only dimming (Electronic dimming only from a minimum to 1200 Watts.)	146-149	57-58	92-95
		To be determined	150-255	59-100	96-FF

Note :   *The pan and tilt coarse channels set the center position of the position macro. The Mspeed channel is used to control the speed of the macros*

With the Mspeed set at the default value of DMX 0-4 all internal effects complete moves at approximately 2.5 seconds. This provides a pleasing look for those customers that do not want the additional variation given by using the Mspeed channel.

With the Mspeed set between DMX 5-255 all internal effects complete moves at the selected Mspeed time (up to 25 seconds).

Those fixture types that support On Board Programming also support the Internal Effects as part of the On Board programming features. The Internal Effects will operate as an additional programming parameter labeled MACR.

Studio Command 700 Protocol

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
1	Pan	Pan, coarse adjustment	0-255	0-100	00-FF
2	Pan	Pan, fine adjustment	0-255	0-100	00-FF
3	Tilt	Tilt, coarse adjustment	0-255	0-100	00-FF
4	Tilt	Tilt, fine adjustment	0-255	0-100	00-FF
5	Color Function	*Full Speed Control*			
		Continuous	0-15	0-6	00-0F
		Cycle (Speed is set by the Cyan channel)	16-31	6-12	10-1F
		Random (Speed is set by the Cyan channel)	32-47	13-18	20-2F
		TBD	48-127	19-50	30-7F
		MSpeed Controlled			
		Continuous	128-143	50-56	80-8F
		Cycle (Speed is set by the Cyan channel)	144-159	57-62	90-9F
		Random (Speed is set by the Cyan channel)	160-175	63-69	A0-AF
		TBD	176-255	69-100	B0-FF
6	Cyan Wheel	*Continuous Mode. Absolute position across 360 degrees*			
		Cyan Full Saturation	0	0	00
		Open	255	100	FF
		Cycle & Random Modes *(sets the rate for all color wheels when Color function parameter = 16-47)*			
		Slow Rate	0	0	00
		Fast Rate	255	100	FF
7	Magenta Wheel	Magenta Full Saturation	0	0	00
		Open	255	100	FF
8	Yellow Wheel	Yellow Full Saturation	0	0	00
		Open	255	100	FF
9	Zoom	Zoom Narrow	0	0	00
		Zoom Wide	255	100	FF
10	Shutter Function	*Normal Shutter Functions* *(No lamp or dimming functions selected in Control channel)*			
		Close	0-23	0-9	00-17
		Periodic Strobe, Mechanical from 1-4Hz operation	24-27	9-10	18-1B
		Periodic Strobe, Electronic from 5-33Hz operation	28-49	11-19	1C-31
		Random Random Strobe	50-75	20-29	32-4B
		Synchronous Random Strobe	76-101	30-40	4C-65
		Ramp Open / Snap Shut	102-127	40-50	66-7F
		Snap Open / Ramp Shut	128-153	50-60	80-99
		Ramp Open / Ramp Shut	154-179	60-70	9A-B3
		Random Ramp Open / Snap Shut	180-205	71-80	B4-CD
		Random Snap Open / Ramp Shut	206-231	81-91	CE-E7
		Open	232-255	91-100	E8-FF

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
		Lamp Assisted Strobes *(Accessed when the Control channel range = 134-137)*			
		The shutter functions are the same as in the normal shutter function range. Periodic strobes, random random and random synchronous strobes are lamp assisted.			
		Lamp Functions. *(Accessed when the Control channel range = 138-141)*			
		For lamp boost effects, the lamp is boosted above the 700 Watt level for the specified period of time. The lamp is also boosted during the lightning effects.			
		Before another boost or lightning effect can occur, the shutter channel must be moved to either closed or open, or the control channel must be moved outside the lamp function range.			
		Boost functions to black will boost the lamp for the specified time then close the shutter. Boost functions to white will boost the lamp for the specified time, then leave the shutter open with the lamp dimmed.			
		When lightning functions are selected, the dim channel scales the overall brightness of the lightning stroke. Dim at 255 will yield maximum brightness.			
10	Shutter (cont.)	Close	0-23	0-9	00-17
		Periodic lamp strobes	24-49	9-19	18-31
		Random random lamp strobes	50-75	20-29	32-4B
		Synchronous random lamp strobes	76-101	30-40	4C-65
		Boost lamp1.0 second, black	102-105	40-41	66-69
		Boost lamp .75 second, black	106-109	42-43	6A-6D
		Boost lamp .66 second, black	110-113	43-44	6E-71
		Boost lamp .5 second, black	114-117	45-46	72-75
		Boost lamp .33 second, black	118-121	46-47	76-79
		Boost lamp .25 second, black	122-127	48-50	7A-7F
		Boost lamp 1.0 second, white	128-131	50-51	80-83
		Boost lamp .75 second, white	132-135	52-53	84-87
		Boost lamp .66 second, white	136-139	53-55	88-8B
		Boost lamp .5 second, white	140-143	55-56	8C-8F
		Boost lamp .33 second, white	144-147	56-58	90-93
		Boost lamp .25 second, white	148-153	58-60	94-99
		Lightning strike 1	154-157	60-62	9A-9D
		Lightning strike 2	158-161	62-63	9E-A1
		Lightning strike 3	162-165	64-65	A2-A5
		Lightning strike 4	166-169	65-66	A6-A9
		Lightning strike 5	170-173	67-68	AA-AD
		Lightning strike 6	174-179	68-70	AE-B3
		To be determined, default black	180-231	71-91	B4-E7
		Open	232-255	91-100	E8-FF
		Lamp Dimming only. *(Accessed when the Control Channel range = 146-149)*			
		The shutter functions are the same as the normal shutter function range. Dimming is accomplished electronically, lowering the lamp power. Dimming will not go to black. Strobes are mechanical and will go to black.			

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
11	Dim	Close	0	0	00
		Open	255	100	FF
12	MSpeed	Disable	0-3	0-1	00-03
		Longest (252.7 sec.)	4	2	04
		Shortest (0.15 sec.)	255	100	FF
13	Macro (Note 1)	Macro Off	0-5	0-2	00-05
		Pan sweep, small to large angle	6-62	2-24	06-3E
		Macro Off	63-65	25-25	3F-41
		Tilt sweep, small to large angle	66-122	26-48	42-7A
		Macro Off	123-125	48-49	7B-7D
		Clockwise circle, small to large	126-160	49-63	7E-A0
		Macro Off	161-163	63-64	A1-A3
		Counterclockwise circle, small to large	164-198	64-78	A4-C6
		Reserved	199-255	78-100	C7-FF
14	Control	*The Control channel should not be crossfaded.*			
		Safe (disables all Control settings)	0-9	0-4	00-09
		Pan & Tilt MSpeed Off	10-19	4-7	0A-13
		Set Shutter channel to 0 for access to the following commands.			
		Display Off	20-28	8-11	14-1C
		Display Dim	30-38	12-15	1E-26
		Display Bright	40-48	16-19	28-30
		Home	60-68	24-27	3C-44
		Lamp On	80-88	31-35	50-58
		Lamp Off	90-98	35-38	5A-62
		Shutdown *(send for 5 seconds)*	110-130	43-51	6E-82
		Lamp Functions			
		Lamp assisted strobes (Periodic and Random strobe functions are lamp assisted. Ramp functions are not lamp assisted.)	134-137	53-54	86-89
		Lamp functions (modifies the shutter channel)	138-141	54-55	8A-8D
		Lamp/mechanical dimming (Lamp output will vary from a minimum to 700 Watts as the mechanical dimming ranges from 0-100%)	142-145	56-57	8E-91
		Lamp only dimming (Electronic dimming only from a minimum to 700 Watts.)	146-149	57-58	92-95
		To be determined	150-255	59-100	96-FF

Note 1:   *The pan and tilt coarse channels set the center position of the position macro. The Mspeed channel is used to control the speed of the macros*

With the Mspeed set at the default value of DMX 0-4 all internal effects complete moves at approximately 2.5 seconds. This provides a pleasing look for those customers that do not want the additional variation given by using the Mspeed channel.

With the Mspeed set between DMX 5-255 all internal effects complete moves at the selected Mspeed time (up to 25 seconds).

Those fixture types that support On Board Programming also support the Internal Effects as part of the On Board programming features. The Internal Effects will operate as an additional programming parameter labeled MACR.

Studio Command-H Protocol

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
1	Pan	Pan, coarse adjustment	0-255	0-100	00-FF
2	Pan	Pan, fine adjustment	0-255	0-100	00-FF
3	Tilt	Tilt, coarse adjustment	0-255	0-100	00-FF
4	Tilt	Tilt, fine adjustment	0-255	0-100	00-FF
5	Color Function	*Full Speed Control*			
		Continuous	0-15	0-6	00-0F
		Cycle (Speed is set by the Cyan channel)	16-31	6-12	10-1F
		Random (Speed is set by the Cyan channel)	32-47	13-18	20-2F
		TBD	48-127	19-50	30-7F
		MSpeed Controlled			
		Continuous	128-143	50-56	80-8F
		Cycle (Speed is set by the Cyan channel)	144-159	57-62	90-9F
		Random (Speed is set by the Cyan channel)	160-175	63-69	A0-AF
		TBD	176-255	69-100	B0-FF
6	Cyan Wheel	*Continuous Mode. Absolute position across 360 degrees*			
		Cyan Full Saturation	0	0	00
		Open	255	100	FF
		Cycle & Random Modes *(sets the rate for all color wheels when Color function parameter = 16-47)*			
		Slow Rate	0	0	00
		Fast Rate	255	100	FF
7	Magenta Wheel	Magenta Full Saturation	0	0	00
		Open	255	100	FF
8	Yellow Wheel	Yellow Full Saturation	0	0	00
		Open	255	100	FF
9	Zoom	Zoom Narrow	0	0	00
		Zoom Wide	255	100	FF
10	Shutter Function	Open, activate Control channel	0-23	0-9	00-17
		Periodic Strobe	24-49	9-19	18-31
		Random Random Strobe	50-75	20-29	32-4B
		Synchronous Random Strobe	76-101	30-40	4C-65
		Open	102-255	40-100	66-FF
11	MSpeed	Disable	0-3	0-1	00-03
		Longest (252.7 sec.)	4	2	04
		Shortest (0.15 sec.)	255	100	FF

Channel	Parameter	Description	Value (dec.)	Value (%)	Value (hex)
12	Macro (Note 1)	Macro Off	0-5	0-2	00-05
		Pan sweep, small to large angle	6-62	2-24	06-3E
		Macro Off	63-65	25-25	3F-41
		Tilt sweep, small to large angle	66-122	26-48	42-7A
		Macro Off	123-125	48-49	7B-7D
		Clockwise circle, small to large	126-160	49-63	7E-A0
		Macro Off	161-163	63-64	A1-A3
		Counterclockwise circle, small to large	164-198	64-78	A4-C6
		Reserved	199-255	78-100	C7-FF
13	Control	*The Control channel should not be crossfaded.*			
		Safe (disables all Control settings)	0-9	0-4	00-09
		Pan & Tilt MSpeed Off	10-19	4-7	0A-13
		Set Shutter channel to 0 for access to the following commands.			
		Display Off	20-28	8-11	14-1C
		Display Dim	30-38	12-15	1E-26
		Display Bright	40-48	16-19	28-30
		Home	60-68	24-27	3C-44
		Shutdown *(send for 5 seconds)*	80-130	31-51	50-82
		To be determined	131-255	52-100	83-FF

Note 1: *The pan and tilt coarse channels set the center position of the position macro. The Mspeed channel is used to control the speed of the macros*

With the Mspeed set at the default value of DMX 0-4 all internal effects complete moves at approximately 2.5 seconds. This provides a pleasing look for those customers that do not want the additional variation given by using the Mspeed channel.

With the Mspeed set between DMX 5-255 all internal effects complete moves at the selected Mspeed time (up to 25 seconds).

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