

DMX & Your Holiday Display - Is It For You?

Mark "Zman" Zembruski

Disclaimer: There is much information, and options available for DMX. All subject matter, references and resources covered in this presentation are at the sole discretion of the author and are based on personal experience, research or preferences.



DMX - Let the Quest Begin

You already have an outstanding *Christmas* display. It's all the rave in the 'hood. However, something is missing, you want to take your display to the next level, and **BOOM**, you slam into **DMX!** What is it? Can I use it? How do I integrate it? Isn't it expensive? What's all the hype anyway? You already know **AL**, **LOR** and possibly **DIY**, but *these 3 little letters* start to strike fear in your heart. Shake your lighting confidence. You get the cold sweats at night and have nightmares about that 3 headed monster, **D-M-X !!!!!** Attending this session will slay that monster, make sleep more peaceful, and get you excited about your display again. OK, maybe this is not you, but there is a mystery about DMX you can't quite put your finger on. This session will peel the onion back, without the tears, and give you the information you need to determine whether this option is possible in your display.

Be forewarned, it's a very slippery slope.....



DMX - Is It For You?

- What is it?
- Common Terms
- Requirements
- Miscellaneous
- DMX vs AC Control
- DMX Set Up
 - Channel Allocation / Base Addressing
- DMX Channel Mapping
- Advantages
- Disadvantages
- Summary
- DMX Supplement
 - LOR - DIY - Cabling
 - LOR Use Model - LOR Sample DMX Sequence Set Up - LOR DMX Test Console



DMX - What is it?

- **DMX** = Digital Multiplexed Signals
- DMX512 is a **Lighting Protocol / Standard**
 - Created in 1986 by the United States Institute for Theatre Technology (USITT)
 - Language to standardized the interface between controllers, dimmers and fixtures
 - AL - Dlight - LOR - Renard are all **LANGUAGES**
 - Leverages EIA-485 standard for wiring
 - Also referred to as RS485
 - Influences ALL DMX limitations
 - Relies on a Transmit (Tx) and Receive (Rx) on a twisted wire pair, plus a common/ground
 - 8bit Stream Data (**0 to 255**)
 - Enhanced during the 90's out of necessity
 - Updated by Entertainment Services & Technology Association (ESTA)
 - Evolved into DMX512A
 - DMX512A supports 2 twisted pairs plus a common/ground
 - Allows RS485 to work in full duplex mode
 - RDM (Remote Device Mgmt) was the primary by-product
 - Provides "real time" fixture status updates
- For the Christmas Light enthusiast, DMX is just another lighting **OPTION!**



DMX - Common Terms

- DMX "Network" = **DMX Universe**
 - Consists of a "Controller" and spectrum of independent channels, distributed across DMX Fixtures
- DMX lights = **DMX Fixtures or Loads**
 - *Generally* one Universe allows **32 different/unique** fixtures
 - RS485 dependent. Newer RS485 drivers are increasing this limitation.
- **DMX Channels**
 - On / Off / Range / Intensity Value
 - One DMX universe has a maximum of **512** independent channels
 - *Typically* channels distributed across multi-channel DMX Fixtures
 - 16 Channels allocated to a fixture (typically)
 - 32 devices x 16 channels = 512
 - Channel Range (Intensity Value) - from **0 (off)** to anything **greater than 0 = (on)** - **up to 255 (100%)**
 - Not uncommon for channels to have different sub-features within a channels range ex. 0-25 pulse strobe, 26-75 medium strobe etc...



DMX - Requirements

- **DMX Hardware - What's needed:**
 - **DMX Controller / Console**
 - Not required for a Christmas display
 - Certainly helps with testing & set up
 - Manual (Physical Device)
 - Directly Connects to DMX Universe fixtures
 - **DMX Programming - Computer**
 - Interfacing software
 - Replaces the need for a physical console (above)
 - Light-O-Rama (S1 or S2), Vixen, Light Show Pro, Animation Director
 - **DMX Dongle (Required)**
 - **Gateway into the DMX Universe**
 - Off loads the computer from having to convert program values (above) into DMX values (0-255), creates the DMX Packet information, then streams it
 - Brokers all the translation and communications for the DMX Universe
 - » Talks non-stop in the 'DMX Conversation'
 - USB Communications interface to Dongle



Chauvet DMX-55 Console



DMX - Requirements

- DMX Hardware - What's needed: (Con't)
 - DMX Fixtures (Loads / Devices / Lights)
 - "Obedient Listener"
 - Waits to be told what to do
 - One or Multiple DMX Channels per device
 - Control Fixture feature functions
 - Ranges from 1 channel (on/off) to multiple channels
 - R, G, B, Shutter, Dimmer, Gobo, Spin, Pan, Tilt, Strobe
 - Direct correlation between DMX fixture channels and Sequence programming channels
 - » Although you **MAY NOT** need to put all DMX Channels into your sequence. If you do not use the effect, it does not need to be programmed and left alone (more on this later)
 - DMX Splitter (Optional)
 - 3 Primary roles (depending on device)
 - Branches existing Universe Daisy Chain
 - » Allows flexibility of interconnect
 - » Each branch requires termination
 - Opens gateway to parallel Universes
 - Boosts DMX signal
 - » Extends 32 device limit to the new branch



DMX - Fixtures

- Hundreds of Fixture Types Support DMX
- Controllable Intelligent Effects
 - Floods
 - Mirror Balls
 - Snow
 - Fog
 - Strobes
 - LED Floods / Panels
 - Special Effects
 - Fire
 - Fireworks
 - Confetti
 - RGB Pixel Options
 - Animation / Video
 - Lasers
 - Spot Lights
 - AC Dimmer Packs
 - Incandescents
 - Yoke / Moving Head
 - Scanners
 - Bubbles
 - Animatronics
 - Motors
 - Servos



DMX - Requirements

- **Communication and Power**
 - **DMX signal requires a continuous Daisy Chain communications interconnect**
 - **DMX Output -> Load -> Load -> Termination**
 - DMX output = DMX Dongle or Console
 - All Fixtures have DMX In - DMX Out plugs
 - **Maximum Length of Daisy Chain 1200m / ~4000ft**
 - **Termination = 120 Ohm .25W resistor**
 - Across Pins 2 & 3
 - Required at the end of the Daisy Chain to eliminate DMX signal reflections
 - DMX Fixture - May a have Terminator built in
 - Terminating Plug
 - DIY Methods
 - **Power is separate from communications**
 - Each fixture will have its own power requirement



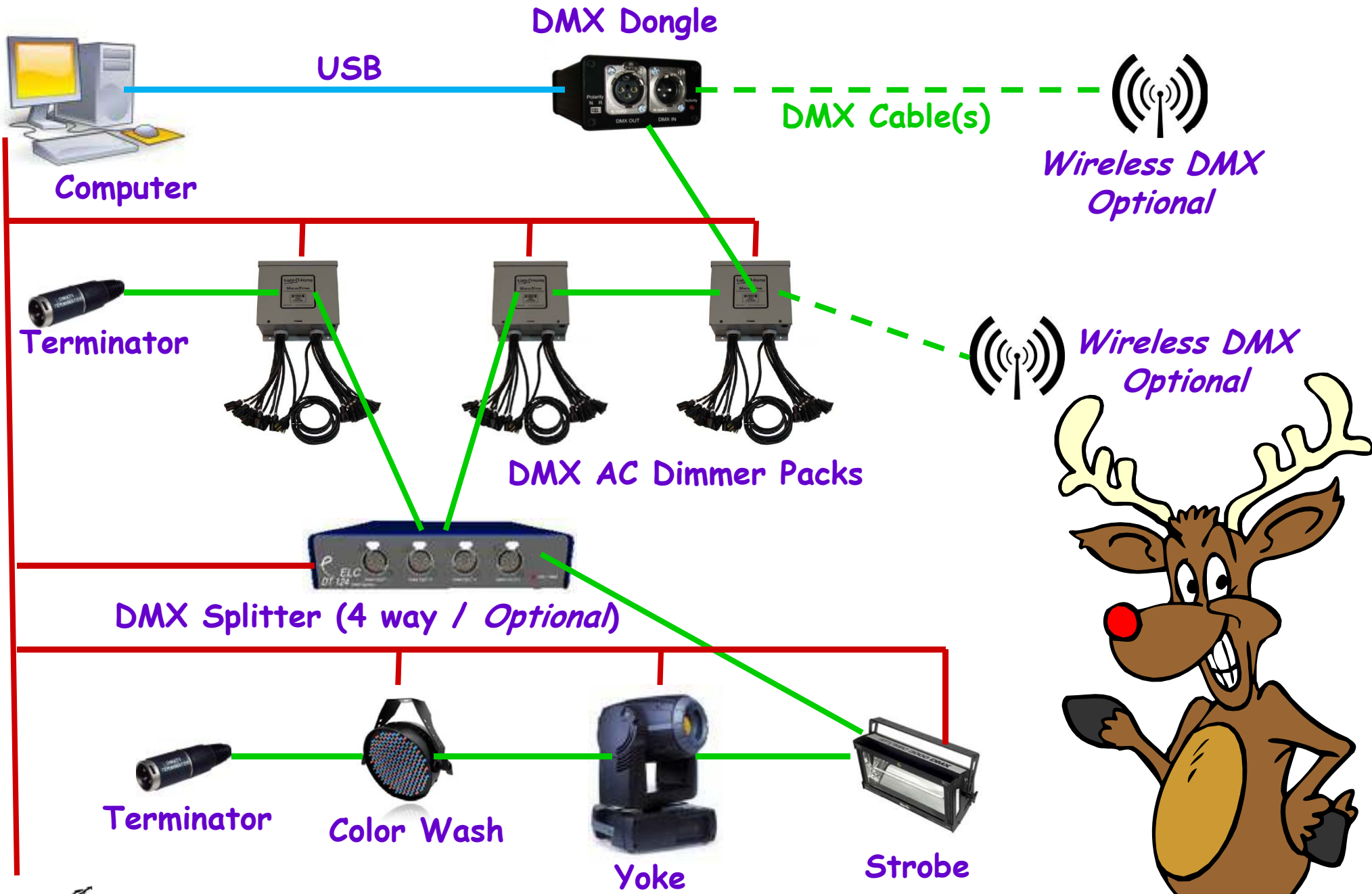
DMX - Requirements



3 pin XLR male/female



- Communication and Power (Con't)
 - Communications Interconnect (Cabling)
 - XLR 3 Pin Connector (Most common, functional, not DMX512A compliant)
 - XLR 5 pin Connector (DMX Standard)
 - As DMX512A progresses, these will be more commonplace but it will take many years to replace 3 pin devices
 - XLR 3 to XLR 5 adaptors can be made or bought
 - XLR Trivia - What does it mean?
 - Cannon Electric in Los Angeles, 1958 creates Cannon Plug/Connector, now part of ITT
 - » Cannon X series, later added a Latch, finally added Rubber to cover connections
 - 3 Primary Interconnect cables:
 - DMX Cords (XLR 3 & 5 Pin)
 - » Specially Shielded
 - » 120 Ohm
 - Microphone Cord (XLR 3 Pin)
 - » Acceptable for runs of under 500 ft
 - » 75 ohm
 - DIY RJ45 with Cat5e
 - » http://www.esta.org/tsp/working_groups/CP/docs/DMXoverCat5_Summ.pdf
 - » XLR 3 & 5 Pin to RJ45 converters available



DMX Components & Fixtures
Example of a DMX Universe

DMX - Miscellaneous

- **Intelligent Channels**
 - AKA "Smart" or "Ichans"
 - Specific to Animated Lighting and Light-O-Rama
 - These are not DMX512A protocol
 - Created by AL and LOR to supported vendor effects
 - Fade, Shimmer, Twinkle, Programmable
 - Number of Intelligent Channels is Universe (Hardware) Dependant
 - Limited number of Intelligent Channels
 - AL = 16 or 32 LOR = 128 (with latest firmware)
 - Able to "float" on "As Needed" basis
 - Convert Vendor Effect to DMX512 value (0-255)
 - Careful not to exceed Smart Channel Limit
 - Unpredictable results
- **Parallel Universes** (multiple) can and do often co-exist
 - No DMX protocol limit to the amount of parallel universes
 - Hardware dependent limitation
- **Art-Net - ACN - E1.31** - What are they, how does it relate to DMX
 - Ability to run DMX over Ethernet
 - Argument is that topology is simpler, star vs daisy chain
 - Ethernet Equipment is typically cheaper
 - More data down a single wire
 - Getting some attention on the DIY forums
 - Generally something the average user does not need to consider



DMX vs. AC Control

Paradigm Shift – “A change from one way of thinking to another”

- AC Control (*AL-LOR-Dlight-DIY*)
 - Controllers - Channels - Lights
 - “X” amount of controllers *dictates:*
 - “Y” amounts of Channels *that:*
 - Equates to “Z” number of lights
 - On/Off - Simple Ramps - 2-3 Effects
- DMX
 - Fixtures - Channels - Controller (Universe)
 - “X” fixtures (with specific features) *requires:*
 - “Y” Channels *that:*
 - Range of Values: 0-255, supports Multiple Effects
 - Resides in our Universe (Controller)



How do we manage this.....

DMX Set Up *(Critical)*

- To understand DMX, you **HAVE** to **UNDERSTAND** the foundation for communicating to DMX Fixtures
- **Fixture Channel Allocation & Base Addressing** are the key to success
 - Fixtures have a set amount of channels to control features (Slides 15-16)
 - Fixture's documentation will describe functions
 - **Channel 1 of Fixture gets assigned as the Base Address** in the DMX Budget (Slides 17-19)
- Between the DMX fixture(s) Base Address and Channel Allocation, it is set up to **only listen, and respond to commands on their assigned DMX Channels** (Slides 20-22)
 - The combination of "ControllerID-DMX Channel(s) is what gets put into your sequence (Slides 31-36)
 - The fixture(s) will only respond to commands within the Channel Assignment and ignores all other DMX commands



DMX - Channel Allocation *(Critical)*

- To understand DMX, you **HAVE** to **UNDERSTAND** Base Addressing and Channel Allocation
- Each **unique DMX fixture** will have a set amount of "**channels**" that control feature functions
 - Referred to as fixture **channel allocation / map**
 - Fixtures have at least one channel
 - Required for Base Address
 - **Typical** configuration is more like 3-10
 - Some fixtures, depending on features, could have 16 or more channels
 - Not all fixture channels may need to be **used** in your display, but they have to be **allocated** in the **DMX Plan**
 - Not **used** correlates to not used in sequencing
 - **There can be no channel overlaps between unique fixtures in the DMX Plan**



DMX - Channel Allocation

• 4 Fixture Universe Example



AC Dimmer Pack - 16 Channels (1-16)



Moving Head - 8 Channel



Flood Wash - 6 Channel

CHANNEL	FUNCTION (16-BIT MODE)
1	Pan
2	Pan Fine
3	Tilt
4	Tilt Fine
5	Shutter
6	Color
7	Gobo
8	Gobo Rotation

1	2	3	4	5	6
RGB 000~029	Red 000~255	Green 000~255	Blue 000~255	Strobe 000~255	Dimmer 000~255
Pulse 030~119 (Slow>Fast)	No Function			No Function	
Color Macros 120~149	Color Macro 000~255			Chase Speed 000~255	
RGB Chase 150~179		No Function	No Function	Program Speed 000~255	
Color Change 180~209	No Function			No Function	
Color Change w/ fade 210~239					
Sound 240~255					



Strobe - 3 Channel

Channel	Value	Percent	Function
1	0 - 5	0 - 1	Flash intensity
	6 - 255	2 - 100	Blackout Minimum to maximum
2	0 - 255	0 - 100	Flash duration
			0 - 650 ms @ 50 Hz AC, or 0 - 530 ms @ 60 Hz AC
3	0 - 5 6 - 255	0 - 1 2 - 100	Flash rate
			No flash (single flash with ch. 1) 0.5 - 25 Hz @ 50 Hz AC, or 0.6 - 30 Hz @ 60 Hz AC

DMX - Base Address (*Critical*)

- DMX Fixtures need an *identity* to know where they reside in the DMX Budget, then listen for what to do and when to do it.
 - Each *unique DMX fixture* has to have a *unique Base Address*
 - "DMX Budget" is 512 Channels (per universe)
 - Base Address determines the fixture(s) location in the DMX Budget
 - Base Addresses can be *randomly* assigned anywhere in the range of 1 - 512
 - Typically Base Address/channels are assigned sequentially in the *DMX Plan* to make mapping easier, but they do not *HAVE* to be sequential
 - "*Like*" fixtures can have the same Base Address. These are referred to as *SLAVES* and will respond exactly as the "Master" device does
 - Base Address is configurable for every DMX fixture
 - *DMX Dipswitch* - Binary address
 - *LED program screen*
 - *DMX Address Editor* - Stand alone device or unit
 - » *Fixture plugs into Unit and Base Address is flashed*



DMX - Base Address

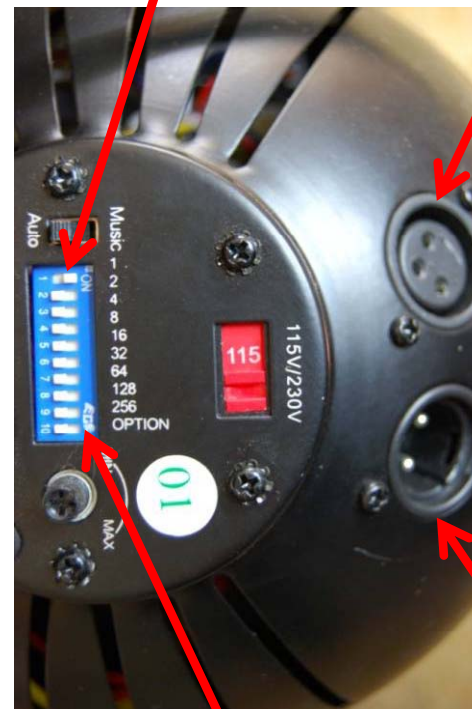
- Example of DMX Dipswitch Binary Assignment Table

DIP switch Setting					#9	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
0 = OFF					#8	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
1 = ON					#7	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
#1	#2	#3	#4	#5	#6	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
0	0	0	0	0	1	32	64	96	128	160	192	224	256	288	320	352	384	416	448	480	
1	0	0	0	0	2	33	65	97	129	161	193	225	257	289	321	353	385	417	449	481	
0	1	0	0	0	3	34	66	98	130	162	194	226	258	290	322	354	386	418	450	482	
1	1	0	0	0	4	35	67	99	131	163	195	227	259	291	323	355	387	419	451	483	
0	0	1	0	0	5	36	68	100	132	164	196	228	260	292	324	356	388	420	452	484	
1	0	1	0	0	6	37	69	101	133	165	197	229	261	293	325	357	389	421	453	485	
0	1	1	0	0	7	38	70	102	134	166	198	230	262	294	326	358	390	422	454	486	
1	1	1	0	0	8	39	71	103	135	167	199	231	263	295	327	359	391	423	455	487	
0	0	0	1	0	9	40	72	104	136	168	200	232	264	296	328	360	392	424	456	488	
1	0	0	1	0	10	41	73	105	137	169	201	233	265	297	329	361	393	425	457	489	
0	1	0	1	0	11	42	74	106	138	170	202	234	266	298	330	362	394	426	458	490	
1	1	0	1	0	12	43	75	107	139	171	203	235	267	299	331	363	395	427	459	491	
0	0	1	1	0	13	44	76	108	140	172	204	236	268	300	332	364	396	428	460	492	
1	0	1	1	0	14	45	77	109	141	173	205	237	269	301	333	365	397	429	461	493	
0	1	1	1	0	15	46	78	110	142	174	206	238	270	302	334	366	398	430	462	494	
1	1	1	1	0	16	47	79	111	143	175	207	239	271	303	335	367	399	431	463	495	
0	0	0	0	1	17	48	80	112	144	176	208	240	272	304	336	368	400	432	464	496	
1	0	0	0	1	18	49	81	113	145	177	209	241	273	305	337	369	401	433	465	497	
0	1	0	0	1	19	50	82	114	146	178	210	242	274	306	338	370	402	434	466	498	
1	1	0	0	1	20	51	83	115	147	179	211	243	275	307	339	371	403	435	467	499	
0	0	1	0	1	21	52	84	116	148	180	212	244	276	308	340	372	404	436	468	500	
1	0	1	0	1	22	53	85	117	149	181	213	245	277	309	341	373	405	437	469	501	
0	1	1	0	1	23	54	86	118	150	182	214	246	278	310	342	374	406	438	470	502	
1	1	1	0	1	24	55	87	119	151	183	215	247	279	311	343	375	407	439	471	503	
0	0	0	1	1	25	56	88	120	152	184	216	248	280	312	344	376	408	440	472	504	
1	0	0	1	1	26	57	89	121	153	185	217	249	281	313	345	377	409	441	473	505	
0	1	0	1	1	27	58	90	122	154	186	218	250	282	314	346	378	410	442	474	506	
1	1	0	1	1	28	59	91	123	155	187	219	251	283	315	347	379	411	443	475	507	
0	0	1	1	1	29	60	92	124	156	188	220	252	284	316	348	380	412	444	476	508	
1	0	1	1	1	30	61	93	125	157	189	221	253	285	317	349	381	413	445	477	509	
0	1	1	1	1	31	62	94	126	158	190	222	254	286	318	350	382	414	446	478	510	
1	1	1	1	1	32	63	95	127	159	191	223	255	287	319	351	383	415	447	479	511	

Table 2: DIP switch address settings

Fixture base address assigned to 1 in picture

DMX Out Female



Example Dipswitch:1-9 for DMX Base Assignment and #10 (Option) for modal operations



DMX In Male

DMX - Base Address

- Example of DMX Fixture - LED Program Screen



Fixture Base Address assigned to 65 programmed via push button interface

Example of fixture with both 3 & 5 pin XLR interfaces. Both with DMX In/Out plugs



DMX - Channel Mapping

- 4 Fixture Universe Example - 512 Channels
 - **Strobe = 3 channels**
 - Randomly assign Base Address of **10**
 - DMX Channel 10 is channel 1 of the Strobe
 - DMX Channel 11 is channel 2 of the Strobe
 - DMX Channel 12 is channel 3 of the Strobe
 - DMX Channels 10-12 are dedicated to the Strobe
 - **Color Wash = 6 Channels**
 - Base Address can be ANYTHING besides 10-12
 - To keep some sequential order, Base Address gets assigned to **13**
 - DMX Channel 13 is channel 1 of Wash
 - DMX Channels 14 - 18 are channels 2 - 6 of Wash
 - DMX Channels 13- 18 are dedicated to the Wash
 - Note: Channels 1 and 5 on color wash, plus 1 and 3 on strobe are good examples where a channel has multiple feature options on the same channel. They are controlled within the 0-255 value range. This is important to understand

Note - refer to Supplement section slides 31 - 37 for LOR assignment example



DMX - Channel Mapping

- 4 Fixture Universe Example - 512 Channels
 - Moving Head (Yoke) Light = 8 Channels
 - Base Address can be ANYTHING besides 10-18
 - To randomize things we will assign Base Address to the Yoke of **35**
 - DMX Channel 35 is Channel 1 of Yoke
 - DMX Channels 36 - 42 are channels 2-8 of Yoke
 - DMC Channels 35 - 42 are dedicated to the Yoke
 - AC Dimmer Packs = 16 Channels
 - Base Address can be ANYTHING besides 10-18, 36-42
 - To keep some sequential order, Base Address gets assigned to **43**
 - DMX Channel 43 is channel 1 of this Dimmer Pack
 - DMX Channels 44-58 are channels 2 - 16
 - DMX Channels 43-58 are dedicated to the Dim Pack
 - Create a channel map that makes sense to **YOU!**
 - DMX has no predefined map - free assignment
 - K.I.S.S. "Keep It Stupid Simple"
 - **Caution - Ensure channel map has NO overlaps**

Note - refer to Supplement section slides 31 - 37 for LOR assignment example



DMX - Advantages

- DMX is an open, published *protocol*
 - Clearly defined standard, that is used world wide
 - Not proprietary to lock you into hardware
 - Example : Animated Lighting, Light O Rama
 - Runs at 250 Kbs - *Which:*
- *Allows more channels:*
 - 512 per Universe
 - Reality 32 *Unique* Loads (Maximum per Universe)
 - "Real" limitation is your available amperage
 - Unlimited "Like" Devices or "Slave" Devices
 - » Slave device = fixtures with same Base Assignment
 - » Each Fixture will have own power
 - » Reside within the daisy chain or Parallel Universe
- *With longer interconnect length*
 - Maximum Length of Daisy Chain 1200m / ~4000ft
- *Multitude of DMX Dongle options*
 - Branded off the shelf products
 - LOR - AL - Enttec Pro and more....
 - Plethora of DIY equipment
 - <http://doityourselfchristmas.com>
 - <http://diylightanimation.com/>
- Due to DMX512A protocol, easier to blend products



DMX - Advantages

- More reliable protocol
 - Faster and continuous communications
 - DMX Packets are sent continuously to all 512 channels, 44 times a second
 - Other lighting protocols (AL, LOR, D-Light) are sent on as needed basis
 - Less chance for stuck channels
 - Hardware and software typically do not require firmware updates
- More light / channels for your \$\$
 - Intelligent fixtures that do more than just on/off
 - 1 DMX flood light supports "16 Million Colors"
 - Ex. - 1 DMX Flood replaces 4 LED / incandescent R-G-B-W Floods
 - Still retain the benefit of LED technology
 - Gain more colors for washing
 - Cheapest cost per channel for Christmas light displays
 - Amortize the cost to gain access to 512 channels for animation purposes
 - 32 - 16 channel controllers
 - » @ ~ \$150 each = \$4800 (LOR PC Kits)
 - » @ ~ \$90 each = \$2880 (Lynx DIY)
- **More Pop and Sizzle for your display**
 - WOW! Factor
 - Your display will be unique and provide more a memorable experience for your visitors
 - Continues to be more unique development within the DMX world than regular lighting techniques.
- There are many Forums available for help and advice



DMX - Dis-Advantages

- Sophistication can be costly
 - High Effect Fixtures = \$\$
 - Prices are becoming more reasonable over time
- Will have a learning curve
 - Anything new falls into this category
- Different hardware requirements
 - Dongles - Fixtures - Cabling
 - **Fixtures require weatherproofing**
 - Majority of fixtures "Indoor" rated
 - Outdoor available but \$\$
- Requires another "Plan"
 - DMX Fixture / Channel Assignment / map
 - Communication / Power Scheme
 - Fixture measurements (Moving/scanning devices)
 - Horizontal / vertical limits of fixture movement, focusing etc....
- **More Channels in Sequences**
 - Extra sequencing considerations
 - Measurements / Patterns / Channel Interactions/Dependencies
- **Competes For a Slice of Our Display Budgets**



DMX - Resources

- USITT
 - <http://www.usitt.org/DMX512.aspx>
- ESTA
 - <http://www.esta.org/>
- DMX For Dummies
 - http://www.dovesystems.com/index2.php?option=com_content&do_pdf=1&id=30/
- *DMX YouTube Video Series - (Very good, very easy and comprehensive)*
 - http://www.youtube.com/view_play_list?p=F66259177229499F&search_query=dmx+info&rclk=pti
- DMX512-A - Wikipedia
 - <http://en.wikipedia.org/wiki/DMX512-A>
- Christmas in Shirley
 - <http://christmasinshirley.com/wiki/index.php?title=DMX>
- Ujjal's 512 Website
 - <http://www.dmx512-online.com/>
- RS485 References
 - <http://en.wikipedia.org/wiki/EIA-485>
 - <http://www.lammertbies.nl/comm/info/RS-485.html>
- DMX Fixture Vendors (sample)
 - Chauvet
 - <http://www.chauvetlighting.com/>
 - Elation
 - <http://www.elationlighting.com/>
 - Music Trends
 - www.musicrends.com/
 - Martin Entertainment
 - <http://martin.com>
 - Gearsource (Used)
 - <http://www.gearsource.com/>
 - Deal Monger (Used)
 - <http://shop.ebay.com/deal-monger/>



Summary:

- DMX is a language, just like all the other products we use
 - AL, LOR, Dlight, Renard are languages that speak to AC/triac controlled hardware through specific firmware & programming
- DMX provides a plethora of lighting **OPTIONS**
 - **BUT**, it is just another way to add lighting to a display
- DMX will add a whole new aspect to your display
 - **Wow! & Cool Factor**
 - Creates better memories for your visitors
- Differentiate your display from others
- There are considerations before implementing
 - DMX may or may not be applicable for you



Supplement

Light-O-Rama

Use Model

Base Assignment / Channel Map Example

DMX Test Console

Do it Yourself - DIY
Cabling



DMX & Light-O-Rama

2 Use Models

1. *iDMX* within LOR Network

- LOR's DMX "Dongle"

- Resides inline within LOR network
 - "Just another controller"
 - Translates LOR to DMX
- Requires RS485 Adaptor for communication
 - TIA/EIA 568B (Standard Ethernet Cat 5) & XLR 3 Pin DMX Cable
- Powered by USB485B, LOR Controller or 12VDC Power Supply
- Compatible with Easy Link Lighters
- Maximum 224 Universes today (1 *iDMX* required per Universe)
 - Daisy Chained per DMX512
 - *S2 Supports 4 Networks*
 - 458,752 addressable DMX addresses
 - Manage latency with RS485 Network Repeater (LOR Accessories)
 - You will exhaust comms bandwidth and CPU before you ever reach the limit
 - Reality is closer to 5000 channels
- Latest *iDMX* firmware recommended, 1.4.1 to fully support DMX512 protocol



DMX & Light-O-Rama

2 Use Models

2. LOR Controller in pure DMX Universe

- Most LOR Controllers Support DMX
 - *Firmware upgrade to 4.20 or higher required*
- DMX AC Dimmer Pack
 - Fixture within DMX Universe
 - 16 channels
 - **Very economical** (PC Kits) Compared to other branded products
- Auto detects between LOR or DMX signals
 - In DMX Universe, listens and reacts to DMX512 only
 - DMX Base Assignment
 - Controller ID = Base Assignment
 - Starts at channel 1
 - Sequential through 16
 - Refer to DMX-DOC below for Base Assignment mapping
- Communication
 - **'May'** require a special XLR to RJ45 adaptor
 - Depends on DMX Dongle / Position in Daisy Chain
 - Custom DIY - Refer to DMX-DOC below for diagram
 - Purchase from LOR On-line store (Accessories)
 - If last fixture in Universe still requires termination
 - Doug Fleenor Design - Why Terminate?
 - » <http://www.dfd.com/whyterm.html>
 - TIA/EIA 568B (Standard Ethernet Cat 5)
- LOR DMX-DOC Resource Document:
 - <http://www.lightorama.com/Documents/DMX-DOC.pdf/>

LOR1600W
LOR800W
LOR1602W
CMB16D (DC card)
LOR1602MP3
CTB08D
CTB16D
CTB16PC
CTB16K (all formats)
CTB16PC kits



DMX & Light-O-Rama

DMX Base Address to LOR Controller ID Map

- LOR Controller IDs use Hex
- DMX channels are sequential

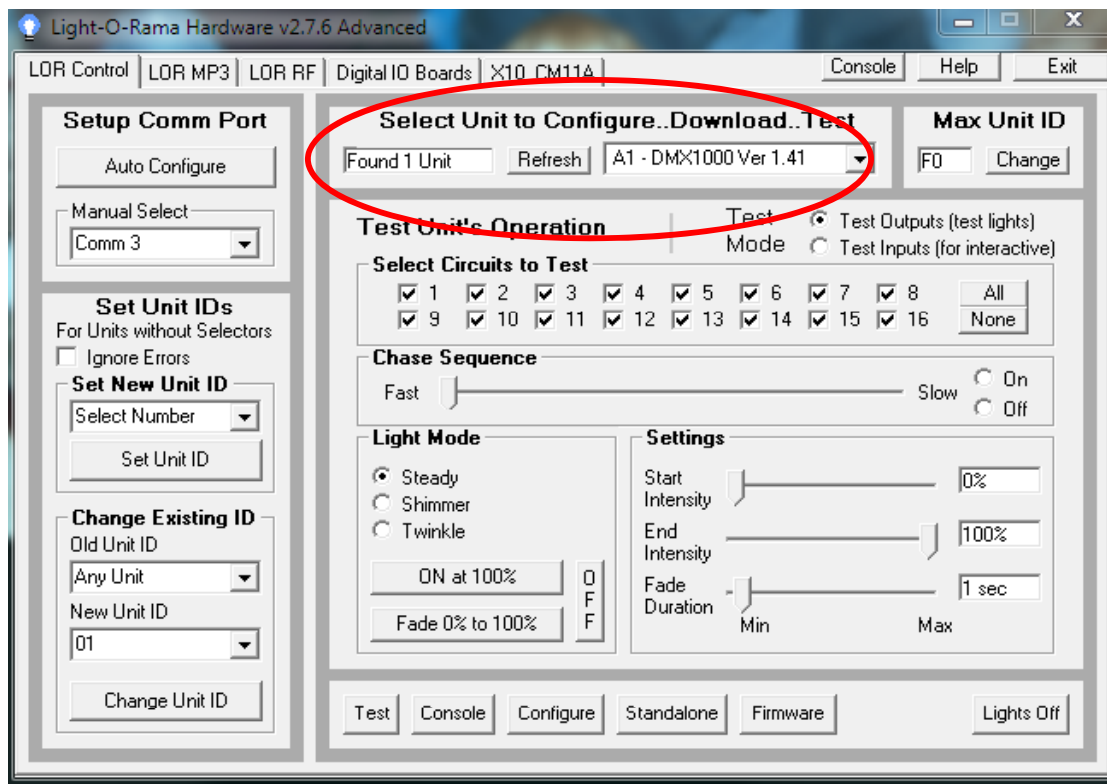
LOR Unit ID	DMX Address	LOR Unit ID	DMX Address
"01"	1	"11"	257
"02"	17	"12"	273
"03"	33	"13"	289
"04"	49	"14"	305
"05"	65	"15"	321
"06"	81	"16"	337
"07"	97	"17"	353
"08"	113	"18"	369
"09"	129	"19"	385
"0A"	145	"1A"	401
"0B"	161	"1B"	417
"0C"	177	"1C"	433
"0D"	193	"1D"	449
"0E"	209	"1E"	465
"0F"	225	"1F"	481
"10"	241	"20"	497



DMX & Light-O-Rama

Base Address / Sequence / Channel - Mapping Example

- Remember our 4 fixture universe example?
 - (2) -Yokes (8 ch) / Strobe (3ch) / (2) - Color Wash (6ch) / Dimmer Pack (16 ch)
 - Adding - iDMX with a Controller ID of **A1 = DMX 512 Mode**
 - When plugged into LOR Network:



- LOR sees 1 Controller on the network

DMX & Light-O-Rama

Base Address / Sequence / Channel - Mapping Example

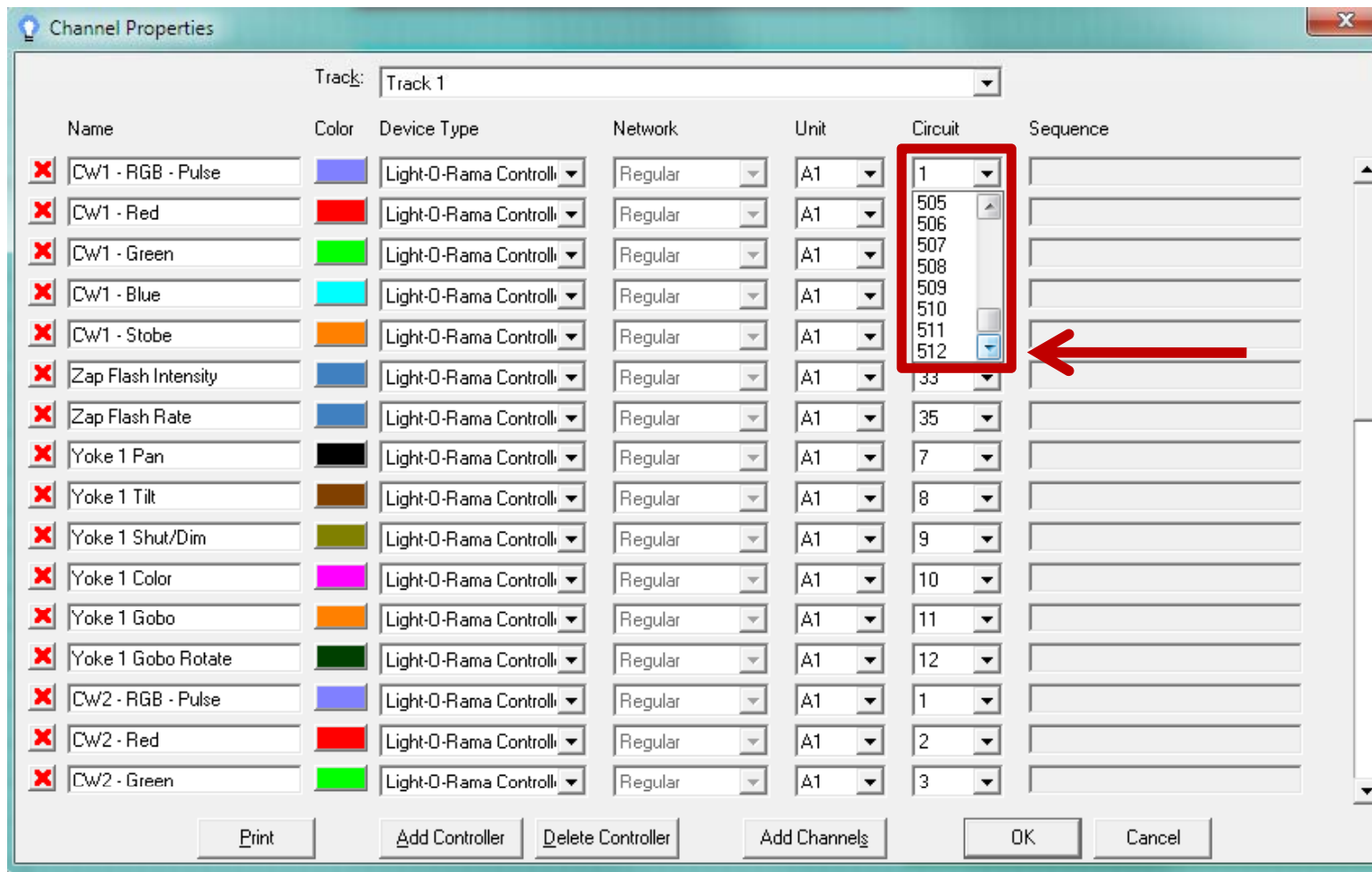
- Color Wash 1 (6 Ch)
 - **Base Assignment = 1 (A1-1)**
 - Yoke 1 (8 Ch)
 - **Base Assignment = 7 (A1-7)**
 - Color Wash 2 (6 Ch)
 - **Base Assignment = 17 (A1-17)**
 - Yoke 2 (8 Ch)
 - **Base Assignment = 23 (A1-23)**
 - Strobe (3 Ch)
 - **Base Assignment = 33 (A1-33)**
 - AC Dimmer Pack (16 Ch)
 - LOR CTB16PC (ex)
 - **Base Assignment = 49 (A1-49)**
 - LOR Controller ID = 04 (Per chart on [Slide 30](#))
- Remember the Base Address = Ch 1 of the fixture
- Before you connect your DMX Universe, you need to ensure your fixture Base Addresses are set to the appropriate values



DMX & Light-O-Rama

Base Address / Sequence / Channel - Mapping Example

- **Channel Property Grid** - DMX section in Sequence Template - It shows our LOR channel assignment
- 512 Channels available



DMX & Light-O-Rama

Base Address / Sequence / Channel - Mapping Example

- LOR Channel Property Grid** - DMX section in Sequence Template - It shows our LOR channel assignment. Remember iDMX ID = **A1**

Name	Color	Device Type	Network	Unit	Circuit
<input checked="" type="checkbox"/> CW1 - RGB - Pulse		Light-O-Rama Control	Regular	A1	1
<input checked="" type="checkbox"/> CW1 - Red		Light-O-Rama Control	Regular	A1	2
<input checked="" type="checkbox"/> CW1 - Green		Light-O-Rama Control	Regular	A1	3
<input checked="" type="checkbox"/> CW1 - Blue		Light-O-Rama Control	Regular	A1	4
<input checked="" type="checkbox"/> CW1 - Strobe		Light-O-Rama Control	Regular	A1	5
<input checked="" type="checkbox"/> Zap Flash Intensity		Light-O-Rama Control	Regular	A1	33
<input checked="" type="checkbox"/> Zap Flash Rate		Light-O-Rama Control	Regular	A1	35
<input checked="" type="checkbox"/> Yoke 1 Pan		Light-O-Rama Control	Regular	A1	7
<input checked="" type="checkbox"/> Yoke 1 Tilt		Light-O-Rama Control	Regular	A1	8
<input checked="" type="checkbox"/> Yoke 1 Shut/Dim		Light-O-Rama Control	Regular	A1	9
<input checked="" type="checkbox"/> Yoke 1 Color		Light-O-Rama Control	Regular	A1	10
<input checked="" type="checkbox"/> Yoke 1 Gobo		Light-O-Rama Control	Regular	A1	11
<input checked="" type="checkbox"/> Yoke 1 Gobo Rotate		Light-O-Rama Control	Regular	A1	12

Color Wash's only using 5 of 6 channels but you still have to account for all 6

Strobe only using 2 of channels, put here for organization












Which is why we start the Yoke channel assignment at 7. Yokes only using 6 of 8 channels



DMX & Light-O-Rama

Base Address / Sequence / Channel - Mapping Example

- **LOR Channel Property Grid** - DMX section in Sequence Template - It shows our LOR channel assignment. Remember iDMX ID = **A1**
- Secondary set of Wash's and Yoke

Name	Color	Device Type	Network	Unit	Circuit
<input checked="" type="checkbox"/> CW2 - RGB - Pulse		Light-O-Rama Controlli	Regular	A1	15
<input checked="" type="checkbox"/> CW2 - Red		Light-O-Rama Controlli	Regular	A1	16
<input checked="" type="checkbox"/> CW2 - Green		Light-O-Rama Controlli	Regular	A1	17
<input type="checkbox"/> CW2 - Blue		Light-O-Rama Controlli	Regular	A1	18
<input checked="" type="checkbox"/> CW2 - Stobe		Light-O-Rama Controlli	Regular	A1	19
<input checked="" type="checkbox"/> Yoke 2 Pan		Light-O-Rama Controlli	Regular	A1	21
<input checked="" type="checkbox"/> Yoke 2 Tilt		Light-O-Rama Controlli	Regular	A1	22
<input checked="" type="checkbox"/> Yoke 2 Sut/Dim		Light-O-Rama Controlli	Regular	A1	23
<input checked="" type="checkbox"/> Yoke 2 Color		Light-O-Rama Controlli	Regular	A1	24
<input checked="" type="checkbox"/> Yoke 2 Gobo		Light-O-Rama Controlli	Regular	A1	25
<input checked="" type="checkbox"/> Yoke 2 Gobo Rotate		Light-O-Rama Controlli	Regular	A1	26

Second set of Color Wash's only using 5 of 6 channels but you still have to account for all 6

Second Yoke only using 6 of 8 channels, which is why we start at 21



DMX & Light-O-Rama

Base Address / Sequence / Channel - Mapping Example

- **LOR Channel Property Grid** - DMX section in Sequence Template - It shows our LOR channel assignment. Remember iDMX ID = **A1**
- AC Dimmer Pack

Name	Color	Device Type	Network	Unit	Circuit
<input checked="" type="checkbox"/> Dim Pack 1-1		Light-O-Rama Controlli	Regular	A1	49
<input checked="" type="checkbox"/> Dim Pack 1-2		Light-O-Rama Controlli	Regular	A1	50
<input checked="" type="checkbox"/> Dim Pack 1-3		Light-O-Rama Controlli	Regular	A1	51
<input checked="" type="checkbox"/> Dim Pack 1-4		Light-O-Rama Controlli	Regular	A1	52
<input checked="" type="checkbox"/> Dim Pack 1-5		Light-O-Rama Controlli	Regular	A1	53
<input checked="" type="checkbox"/> Dim Pack 1-6		Light-O-Rama Controlli	Regular	A1	54
<input checked="" type="checkbox"/> Dim Pack 1-7		Light-O-Rama Controlli	Regular	A1	55
<input checked="" type="checkbox"/> Dim Pack 1-8		Light-O-Rama Controlli	Regular	A1	56
<input checked="" type="checkbox"/> Dim Pack 1-9		Light-O-Rama Controlli	Regular	A1	57
<input checked="" type="checkbox"/> Dim Pack 1-10		Light-O-Rama Controlli	Regular	A1	58
<input checked="" type="checkbox"/> Dim Pack 1-11		Light-O-Rama Controlli	Regular	A1	59
<input checked="" type="checkbox"/> Dim Pack 1-12		Light-O-Rama Controlli	Regular	A1	60
<input checked="" type="checkbox"/> Dim Pack 1-13		Light-O-Rama Controlli	Regular	A1	61
<input checked="" type="checkbox"/> Dim Pack 1-14		Light-O-Rama Controlli	Regular	A1	62
<input checked="" type="checkbox"/> Dim Pack 1-15		Light-O-Rama Controlli	Regular	A1	63
<input checked="" type="checkbox"/> Dim Pack 1-16		Light-O-Rama Controlli	Regular	A1	64

AC Dimmer Pack,
"CTB16PC" starting
address conforms to
DMX Base
ID/Controller ID
Map LOR Controller
ID is set to "04"



DMX & Light-O-Rama

Hardware Editor / Test Console

The screenshot displays the 'Light-O-Rama Test Console' software. The main interface shows a grid of 32 DMX channels (017-032) with intensity sliders and numerical values. A red box highlights the channel headers, and a red arrow points from channel 024 to the 'Select Channel Group' dropdown menu. The interface includes a 'Controller Type' section with radio buttons for 'Standard Controller', 'DMX1000 - LOR %', and 'DMX1000 - DMX'. It also features 'All On', 'All Off', 'Twinkle', 'Shimmer', and 'Effect Off' buttons. A 'Channel Mode' section has radio buttons for 'Virtual Controllers' and 'Extended Circuit Ids'. A 'Max Unit ID' dropdown is set to 'F0'. A 'Console' button is highlighted in the top right of the main window.



- LOR Test Console
 - Software version of DMX Console
 - Test communications with DMX Universe / Fixtures
 - Access to all 512 DMX Channels
 - "Select Channel Group" cycles Console in banks of 16 channels

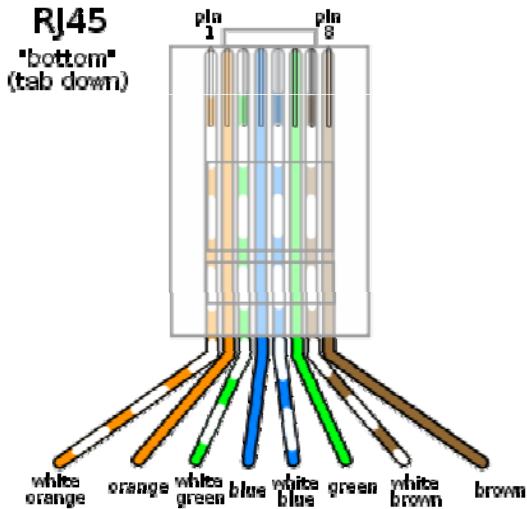
DMX - Do It Yourself (DIY)

- Controllers/Dimmers - Adaptors - Splitters
 - DIY Light Animation - "Lynx"
 - <http://diylightanimation.com/>
 - Do It Yourself Christmas - "Renard"
 - <http://doityourselfchristmas.com/forums/forumdisplay.php?f=34>
 - Many options out there - Google 'DIY DMX'
 - DMX512 is a standard
 - All designs need to comply with the USITT DMX512A Protocol
- Sequencing Software
 - Light Show Pro
 - <http://www.lightshowpro.com>
 - Generic - Native DMX output
 - Supports broadest range of DMX Dongles to date
- Pros / Cons (you decide)
 - Very cost effective
 - *Cheapest per channel DMX option available*
 - Require assembly
 - Time - Soldering - Enclosures considerations
 - Possible unique connection requirements
 - Typically TIA/EIA 568B (Standard Ethernet Cat 5)
 - XLR to RJ45 Adaptors (Parts and Assembly considerations)
 - DIY - Cheaper than 'Off the Shelf' DMX cables
 - Provide some unique options
 - Lynx Express - Light Curves to normalize ramps & fades
 - Cost effective Wireless DMX - eliminates most cabling interconnect
 - Mix and Match with Branded products to extend and preserve existing hardware investment



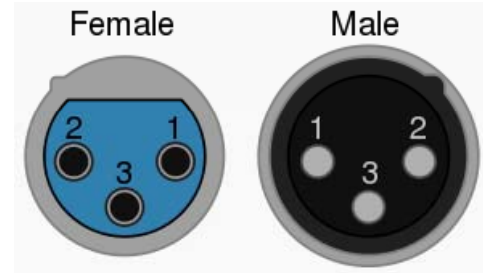
DMX - Cabling

- Primary DMX Connection Diagrams



TIA/EIA 568A Wiring	
1	White and Green
2	Green
3	White and Orange
4	Blue
5	White and Blue
6	Orange
7	White and Brown
8	Brown

TIA/EIA 568B Wiring	
1	White and Orange
2	Orange
3	White and Green
4	Blue
5	White and Blue
6	Green
7	White and Brown
8	Brown



- Pins 1, 2, and 3 are the ones we want to use.
 - Pin 1 = Ground
 - Pin 2 = Signal -ve
 - Pin 3 = Signal +ve

DMX Connection Consideration / Options

- DIY or Off the Shelf
 - LOR to Lynx - Application Specific
 - http://diylightanimation.com/wiki/index.php?title=Light-O-Rama_CollectorsCat_5_Info_-_DIY
 - http://en.wikipedia.org/wiki/Category_5_cable/
 - DMX Components - DIY - Cable
 - Parts Express
 - <http://www.parts-express.com/wire-cable.cfm>
 - Entertainment Systems Inc
 - <http://www.shopesc.com/dmxcable.html/>

DMX Data Tester

- Assists with troubleshooting DMX signal output



Thank you!

Contact Info:

Email - modec@frontier.com

Website - www.woodinvillewonderland.com

User Name - **Zman** on all the forums

