What are these?

Before I was a teacher, I made 2 intro power points for THE INTERNET!

I used the first one as the intro presentation.

The second internet one, I stole the first section for as the paperwork presentation.

These are the other slides from that original presentation. They're still useful and I'll probably canabalize them into something later.

Who Do What

Let's quickly go over jobs in the lighting field (these jobs will sometimes combine/ not exist/ change depending on the project).

- Lighting Designer: The guy who comes up with the design. Decides cues, makes light plot.
- Assistant Lighting Designer (ALD): Usually wrangles paperwork for the LD. Often will assist in cuing the show. Often drafts the plot.
- Programmer: The one who programs the cues into a light board.
- Master Electrician: In charge of realizing the plot. Oversees the hanging and focusing of lights. In charge of electrics crew.
- Assistant Master Electrician (AME): Usually put in charge of electricians to complete tasks set by the ME.
- Electrician: Those who hang and focus lights. Do all the grunt work.

Being an Electrician

Most people start off as an electrician, regardless of whether you want to be a designer, programmer, ME, etc. It gets you familiar with lighting and how it all works.

During a light hang/ focus, an electrician will do the following (and probably way more):

- Hang Lights
- Cable Lights
- Run Power
- Change Lamps
- Insert Gel/ Gobos.
- Focus Lights
- Refocus Lights
- Fix Broken Connectors
- Swapping lenses

The following will be covered in another presentation

- Set Up Lighting Positions
- Set Up Dimmers
- Run Data
- Address Intelligent Lights
- Set Up Light Board

The Tools

Often times, electricians are expected to bring their own tools. 90% of the time it's a crescent wrench, a maglight, and knife. But It's nice to have a few others.



An 8" crescent Wrench will do almost everything in lighting. Hang/ focus a light, attach cheeseborough, set up scaffolding. It's the best!



Maglight/ Flashlight. Though a lot of people just use their phones now. Good idea to have one though.





Cool Tools

But then there's the stuff cool people have. More expensive and/or more specialized.



The leather/ any multitool. They come in all shapes and sizes with a large variety of tools. Get one that has the stuff you want, but I recommend the Leatherman Wave to start. Pliers, screwdrivers and a knife are must-haves



The Stage Junk Focus tool. Made specifically for lighting, it's made to fit all standard lighting bolts. Way faster than adjusting a wrench.



Steel toe work boots. A good pair will last you a lifetime. It's both safe because you won't hurt you toes and useful because you can set things down on you feet and kick things into place easily.

Actually doing it: Hanging a light

Hook C-clamp onto pipe 2. Finger tight C-Clamp 3. Wrench tighten C-Clamp Hook in Safety over pipe, through yoke 5. Pull Shutters





3





1/2

Actually doing it: Circuiting

The big thing about circuiting is to keep it neat. You don't want an unorganized mess of cable. Prevent cables from swagging, bundle cables when able. etc, etc.



Plug pigtail into cable



Tie (like a shoe) every few feet to eliminate swag.



Bundle when possible. Continue until you get to your dimmer and plug in.

Actually doing it: Circuiting (cont.)

Circuits come in a few shapes. The three you'll probably run into the most are Socapex, raceways and floor pockets.



Socapex is basically 6 cables bundled into a giant cable. Pictured is a "break out," which goes on the end of the cable and will have what you plug into. Often, an electrician will run the soco.



A raceway is usually for a dedicated electric pipe.



Floor pockets are dimmers that are inset into the floor. Very handy for lights that are onstage like practical sconces, booms, etc.

Actually doing it: Circuiting (cont.)

Extra circuiting tips:

- When you find yourself with extra cable, coil it up and tie the coil to the pipe. Don't snake it around the pipe or double back.
- Try to recycle tie line along the way. Don't tie a new tie next to another, just retie the one there, but with your cable as well.
- You can run multiple cables at the same time, just try to keep track of which it which.
- Label the connectors of cable with dimmer numbers so you can easily know what you're plugging into.
- If a connection is loose, tape them together with gaff tape.
- Make sure to leave enough cable at the light to let it move freely for focus.

Actually doing it: Changing lamps

To change a lamp, first get to the lamp, usually it's only a screw or bolt away. Remove the burnt out lamp, noting what sort it is. Replace lamp with identical lamp being sure not to touch the new lamp with your skin. screw lamp base back into light



Unscrew to get to base of lamp.



Take out lamp, note type (HPL 575w here). Source 4s have these little clips. pinch them to open.



Put in new lamp. DO NOT TOUCH THE BULB. Doing so puts your finger oils on it, which get super hot and make the lamp blow early. Use gloves or your shirt in a pinch.

Actually doing it: Insert Gel

Gel is colored, transparent plastic that changes the colo a lightoutputs. They come in all kinds of sizes. However, you're going to most commonly run into 6 $\frac{1}{4}$ " (most source 4 ERSsss) and 7 $\frac{1}{2}$ " (s4 pars, 6" fresnels, parnels, etc). Gel often is held in a frame and is the last the light passes through, geneally.



Cut or get the right size gel for the light. Here's a $6 \frac{1}{4}$ s4 ers gel in its frame.



A lot of lights have clips to keep the frame in. Undo it and insert gel.



Actually doing it: Focusing

One of the most important things in lighting: pointing it where it needs to go. There's a lot to focusing and every light is different, but here are a few of the big steps:

- Pan: Loosening the yoke bolt or bitch-pin allows you to pan the light.
- Tilt: Loosening the T-handle will allow you to tilt
 - Often you won't tighten pan or tilt completely until both are in place.
- Run Barrel: Lights with a barel with have a barrel knob. Loosening that will allow you to change the lense/ light relationship, fuzzing or sharpening the light beam.
- Shutters: Pushing in shutters will block part of the light.
- Color: Some designers will want color in for the focus, others want it after. Just confirm with the designer your preference.

Actually doing it: Focus (cont.)

Here are some of the less common things you'll do with focus.

- Rotate the lens: PARs and s4 pars make oval shaped light beams and often you'll have to spin them to align with whatever. On the s4 par, there's a ring near the front of the light that does this. For PARs, you reach into the back and spin the lamp itself.
 - Fun fact: In Canada, they it spinning the banana for some reason.
- Spot/ flood: Fresnels change their beam size by moving the lamps physically closer to the len (flood) or farther away (spot). Often they have a knob on the bottom that, when loosened, allows you to move the housing. Parnels do this same effect, but with rotating a ring towards the front, like the s4 par has.
- Barn doors: Lights without shutters will sometimes have barn doors, which you can use to block off some light to try and focus them into a more specific place.
- Zoom: Zoom lights are magical satan-beasts that have two independent lenses: one for beam size and one for beam focus. Getting them to not suck is difficult at best.

Actually doing it: Fix Connectors

There are a bunch of different connectors, but they all have the same basic setup. Make sure the ground is on the ground and then 90% of the times, the other two wires are interchangeable. Here's a typical stagepin repair



On a stagepin, remove the faceplate.



Oh no! one of the wires came out! Undo the brass screw.



Place the bare wire end inside and rescrew the brass.



Be sure the strain relief will be sandwiched by the faceplate.

Actually doing it: Fix Connectors

Here's an edison plug. it's the same concept as the stagepin, but the strain relief is a separate piece and the wires go into holes where they get squeezed by plates tightened by the screws. twistlocks are very much the same inside.



Undo top screws.



Reseat exposed wire and tighten.

Undo strain.

Actually doing it: Swapping lenses

Changing lenses will change the size of a beam a light outputs. Here's how to swap out a source 4 ERS barrel as well as a source 4 PAR lens.



Undo barrel focus knob completely.



Remove old barrel.



Put in new barrel, replace knob.

That was a lot of stuff. Like woah.

Yes it was. But hopefully you get an idea of the skillset you'll be utilizing on the field. More advanced techniques and skills will be covered in later presentations. But now let's move onto something completely different...

LIGHT BOAAARDS!

Anyway, lets go over the basic parts and functions of a light board.







Light Board parts

Each light board is unique with different abilities, purposes, bells and whistles, but there are a few things that a lot them all have:

- Keypad
- Faders
- encoder wheels
- scroll wheel
- stop/ go buttons
- blackout keys
- bump keys
- pallette keys
- Macro keys
- Softkeys

Most lighting boards also have a poop-ton of other keys and, while there is a lot of overlap from board to board, many are unique in how they function. Learning a specific boards quirks and uses is a super-fun part of lighting.

Also, there are plenty of boards with far, far less parts than these.



SO what do they do? GREAT QUESTION, MAN! HIGH FIVE!

- Keypad: The keypad is used to select lights, set their intensities, program cues, edit effects, everything! It's a keypad of numbers 1-9 and then usually buttons like "at" and "thru" which are used to set levels or select ranges of lights, respectively.
- Faders: Faders are sliders with little buttons that go up or down and they can do a lot of things. In the previous slide, the fader was called the "Grand Master." This is a pretty common one that controls ALL the lights. Bringing that down brings everything down. Faders can also: control one light, control a series of lights, be it's own set of cues, affect effects (both rate and intensity), and much, much more. Many boards let you select what exactly your fader will be.

- Encoder wheels and scroll wheels: These parts give you more manual control over a certain parameter, be it trying to point a moving light someplace, choose a color or dim or brighten a light. You can typically select what parameter a wheel controls at any given point.
- Stop/ Go buttons: These buttons will advance, pause, or step back whatever cue you're in. Some boards have multiples of these and can actually run several cues at a time.
- Blackout key: Pressing this will usually turn off all the lights. Good for emergencies, bad for accidentally pressing.
- Bump keys: Bump keys are often found under a fader. Pressing them generally brings whatever a fader is controlling to full, like a light or many lights. However, they can be programmed to do the exact opposite or any number of other functions.

- Pallette keys: Many new light boards incorporate these keys. A palette is an easy way to store certain parameters to use later on. Say you make a sweet looking green color in an LED and want to use it again later. You save that as a pallette so you can. The keys give you quick access to programming and recalling these palettes.
- Macro Keys: Macros basically do a series of things that you program it to do. Say you were tired of always typing "light 2 at 40%" over and over. you can program a macro to do that for you and then assign that macro to a button. 5 keystrokes just became one.
- Softkeys: Newer boards use screens, and rather than having a button for everything, what a button does changes and what it does depends on what you're doing. soft key 1 will do one thing while patching, one thing while programming and another when you select a specific light, all shown to you by the screen of the light board.

ports:

So that's all the programming, keys and such, but lets look at the back of a light board and see the inputs and outputs This is an ETC ion, but these are standard



- Power input: Duuuuuuh
- Displays out: Many light boards support external monitors (many also have monitors build in). Some also support touch screens.
- USB ports: Light boards can also benefit from having a key board and mouse attached. Other things like fader wings, touch screens and controllers are also commonly supported.
- Ethernet Port: Many light boards can connect to dimmers and other devices over ethernet. The two big systems of this are ETC net (which is used by ETC boards) and artnet, which is used by several other brands.
- DMX outs: This is a common standard with which to control both dimmers and intelligent fixtures. Each DMX out supports 512 addresses (though the board can output far more, but that's over ethernet).
- Midi In/ Out: Midi is a standard often used for triggering other devices such as a light cue triggering a sound cue or vice versa.
- Remote Trigger: Rarely used. For things like switches and sensors to trigger cues.

You know the drill: list, explain, over and over again.

Patching: When you hang a plot, the lights will plugged in all willy nilly into whatever plug was close. To make sense of this chaos, we assign channel numbers to those dimmer numbers. So a front system of dimmer 47, 85 and 6 become channels 1, 2, and 3. Most boards have a patch screen where in it, you input something like "47 at 1 enter" which would put the dimmer into the channel (sometimes they're channel into dimmer instead). Intelligent lights will often take up several "dimmers," though they are actually addresses, which are just data. So an LED may be adresses 56-70, but just one channel.

Syntax: Syntax is like the language the board speaks, the order in which you enter keystrokes. like "47 @ 1 enter," or "97 color recall from cue 17 enter." Syntax is often one of the biggest differences between various boards.

Chan		Address	Туре	
13			Dimmer	
14			Non Dim at 50	
15			Dimmer	
16			Dimmer	
17			Dimmer	
18			Dimmer	
19			Non Dim at 50	
20			Dimmer	
21		30-33	Sea Changer Wash XG	
22	P1	34-37	Sea Changer XG 4ch	
	P2		Dimmer	
30		40-42	Color Block DB4 M9	
31			D60 Lustr+ Direct Str	
32		60-65	Reveal CW M4 A2 Refresh Off	
33			D40 Vivid Direct Str	
34		2/60-64	K9 Pup LEDs	
35		2/66-70	K9 Pup LEDs	
36		2/72-76	K9 Bulldog LEDs	
37		2/77-81	K9 Bulldog LEDs	
38		120-127	Paletta 11	
39		128-135	Vivid R 11	
41		100-112	Mac 300 M4	
42	P1		Dimmer	
	P2	70-96	VL1000 TSD	

1. Live Table 2. Playback Status 3. Patch 4. Submasters 5. Effects

Programming Cues: or, actually building the show. At it's core, programming a cues is just getting what lights you want at what intensity you want with specific timing. All the other stuff is just being able to do it quickly and more efficiently. So you're selecting the lights to be on in a cue and setting them to the desired intensity, color, position, etc. and then recording the cue.

You record cues into a cue-list, which is the order of cues. You also set cue times, which is the time it takes to transition from one cue to the next. There's a lot of fancy things you can do with timing, like making lights come up faster than others go down, or giving specific lights special timing, or having one cue automatically go to the next one after X amount of time. Some boards support running multiple cue-lists at a time, but that's more of a concert/ event thing. Theatre generally uses only one per show.

List 1		Timing			
Cue 💕	Int Up Int D	own Focus	Color	Beam	Dur
1	0) (0)			0
2	2.06	2.06	2.06	2.06	2.06
3	2.06	2.06			2.06
4	2.06	2.06			2.06
5	2.06	2.06			2.06
6	0.4	0.4	0.4	0.4	0.4
6.5	(0				0
6.6	0.4	0.4	0.4	0.4	0.4
6.7	(0				0
6.8	0.4	0.4	0.4	0.4	0.4
6.9	(0	0	0	0	0
7	0.4) (0.4	0.4		0.4

Setting Palettes: We touched on this earlier, but a palette is a stored parameter like color, pan/ tilt, etc. so that it can be referenced later. Most commonly there are focus palettes (pan/ tilt), color, intensity, and beam (gobos, softness, zoom, shutters). Usually this is done by selecting a light or series of lights and then recording them into the palette.

Creating submasters: A submaster is a type of fader with a bunch of lights at various intensities on it. It's basically a cue on a fader. So you set your look on stage and record it to a submaster. Now Whenever you bring up that submaster, those lights will turn on relative to how far up the fader is. All the way up does the exact look you made, part way is only a little bit up. Submasters are used for a lot of things like when a show is very small and not worth programming cues, a quick way to program cues, or to control things like house lights and work lights that need to be brought up independant of cues.

Creating effects: Effects are special things that you program lights to do. Things like having a moving light continuously move in a figure 8, or having an LED cycle through colors automatically or making several lights pop on and off to make lightning. Programming effects can save you a lot of hassle over doing things manually and can pull off a lot of really cool looks. There are a few different types of effects but the two main ones are step-based and absolute. Step based are like miniature cue lists where you tell some lights to come on at x percentage for y seconds, and then another set of light, than another. You then apply this effect to the lights, and they do it. Lightning flashes are an example of step based. Absolute effects doesn't involve specific lights and can be applied to any. They're generally broader like "turn on for 3 seconds, turn on for 2." They also can interact with other lights using the same effect, like having one wait for the other to do the effect before doing it itself.

Effects differ greatly from board to board and are definitely one of the more difficult things to get. We'll go over them in more detail later.

Busking: Busking is running lights live, rather than having a set cue list you follow. This is done by using submasters and multiple cue lists to work with whatever is happening. For multiple cue lists one might have all their moving lights on one cue list, all their LEDs on another, etc. and be mixing and matching to create the desired look. How one goes about doing a live design is a personal preference with no hard and fast rules. Often busking is done for live music or small events where there's not enough time to program.

X/Y consoles: These are old-school consoles. Each fader controls one light and the top and bottom rows are the same lights (aka, both the top and bottom represent lights 1-12). Think of it as each row is one cue that you must manually crossfade between. So while you're in the top cue, you set the bottom row to the next cue, and while you're in the bottom, you set the top. Yes, you actually have to write down the intensity for each light for each cue and set it yourself.

