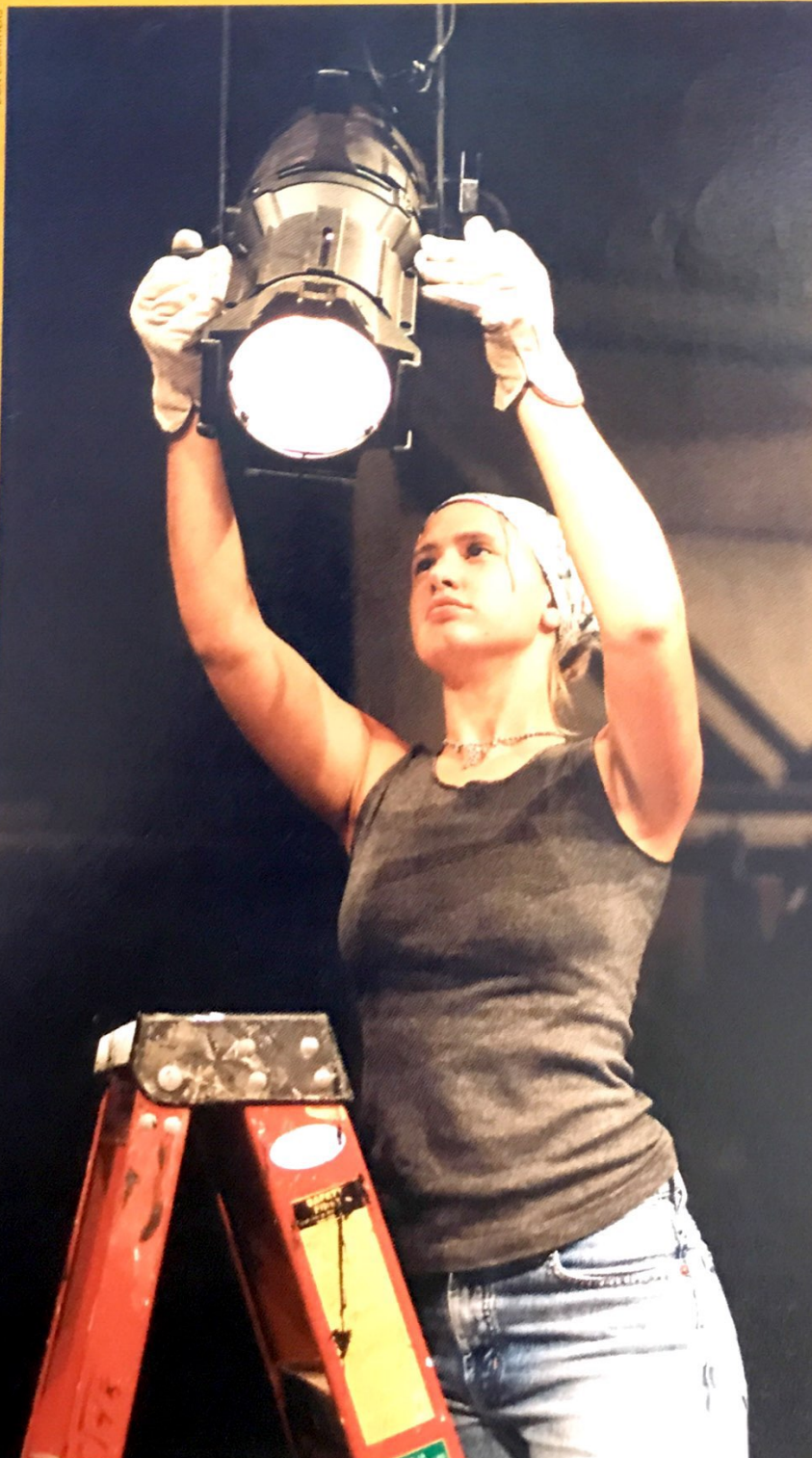


Lights, and... go

*An introduction to lighting design, part two:
from rendering to light plot*

BY SCOTT C. PARKER

DON COMATERS



less miniature microphones have become ubiquitous, and so we see them in rock musicals even if they violate the period and defy logic, as in *Spring Awakening*. The microphone allows a more intimate and internalized experience to become public. It enables the performer to express himself beyond his physical resources.

Rock music favors vocal colors that are rawer and emotionally and psychologically more violent than in earlier styles—musicalized screaming and wailing, in other words. This is another way of rejecting older musical theatre styles, where emotional restraint, studied phrasing, and sheer beauty of sound prevail. In addition, the full-throated vocal stylings that we associate with gospel, blues, and rhythm and blues singers, have been appropriated for the rock musical. So has the nasality of country and western.

Some of the experimental theatre techniques of directors like Peter Brook and Jerzy Grotowski have

been incorporated into the rock musical aesthetic, allowing for a more contemporary, edgy, and overtly performative set of staging conventions. Many rock musicals combine the emotional realism of the Method school of acting with the stand-and-deliver imperative from the School of Rock. The Fourth Wall often disappears. Lead performers can stimulate, agitate, and respond to the audience energy and feedback much as they would in a rock concert.

Rock on. Looking back at the various musical theatre styles we've dissected in this series, it seems remarkable how little time it took, really, for the musical theatre to go from *H.M.S. Pinafore* to *Hair*. Less than a century, in fact. And of course, the changes we've seen on the Broadway stage are but a pale reflection of those we've seen in the wider world.

At its heart, musical theatre is just what it was a hundred years ago:

a place where story, music, dance, and spectacle come together for the expression of cultural ideals and the delight of audiences. No two musicals, whatever their style, achieve that goal in precisely the same way. That's what makes the musical theatre such a boundless and fascinating field of study for teachers like us, and such a rich source of inspiration for students like you.

The listening and watching skills you've developed over this series, coupled with your understanding of the world that each of these musical theatre styles emerged from, will help make you a flexible and dynamic singing actor. Now, whenever you begin rehearsals, you can refer back to these notes as a way of getting into the right stylistic frame for that show. Consider these articles your Ultimate Fake Book. As you mature, personally and artistically, you'll gain more substance to go with the style. ▼

Rock musical syllabus

There are many musicals that fall into the broad category of rock musical, though in a range of subsets of this style. We'll list them in that way, with the understanding that most shows have a mix of influences from across the rock spectrum and beyond.

Hard rock: *Hair*, *The Who's Tommy*, *Jesus Christ Superstar*, *Hedwig and the Angry Inch*, *Rent*, *Evita*, *Spring Awakening*

Revues and jukebox musicals (use songs or performances by a specific group of performer as their musical score): *Mamma Mia!*, *Movin' Out*, *Leader of the Pack*, *Smokey Joe's Café*, *Jersey Boys*, *Beehive*, *Buddy: The Buddy Holly Story*, *All Shook Up*

Pastiche musicals (try to sound like an earlier rock style, though they are written more recently): *Little Shop of Horrors*, *Grease*

Motown/R&B: *Dreamgirls*, *The Wiz*, *The Color Purple*

Soft rock/pop: *Pippin* (strong Motown influence), *Godspell* (strong folk influence), *Jekyll & Hyde*, *Miss Saigon*, *Aida*, *Wicked*, *The Last Five Years*

Research resources

Soundtrack and cast albums are available for all of the shows listed above; many have been made into films, though not all successfully. The movie versions of *Godspell* (1973), *Jesus Christ Superstar* (1973), and *Hair* (1979), give some sense of the early rock musical period, but often lack the dynamism of a live performance. A decent video was made of *Pippin* (1982 touring production starring Ben Vereen); the final Broadway cast of *Rent* (2009) is preserved in a live video; and the

recent *Dreamgirls* is a fine film on its own terms.

Some essential singers

Rock: the Beatles, the Rolling Stones, Janis Joplin, Robert Plant, Pat Benatar, Blood, Sweat & Tears, Alanis Morissette

R&B/pop: Ray Charles, Patti LaBelle, James Brown, Aretha Franklin, Mariah Carey, George Michael, Whitney Houston, Billy Joel, Celine Dion, Elton John, Michael Jackson

Folk: Bob Dylan, Peter, Paul and Mary, Joni Mitchell, Joan Baez, Simon and Garfunkel

Soft rock: James Taylor, Carly Simon, Linda Ronstadt, the Carpenters, ABBA

Country: Johnny Cash, Bonnie Raitt, Larry Gatlin, Shania Twain, Willie Nelson, Dolly Parton

—J.D. and R.D.V.

article in our January 2009 issue, Scott C. Parker described the fundamental objectives of the lighting designer's work and guided readers through the designer's process of script analysis and the use of visual research to arrive at a vision of what the show should look like. (If you'd like to review, you can find that article on our website.) This month he outlines the next steps: figuring out where to hang the lighting instruments and how to control them to achieve the effects shown in the rendering, and communicating those solutions to the stage crew who will hang the lights in the theatre.

BY THE END of the first article in this introduction to lighting design we had created a light rendering for the robbery scene (Act II, Scene 2) in *Carousel*. Let us now assume that after multiple meetings (and probably some revisions) the director has approved the lighting ideas expressed in this and other renderings. It's time to figure out where to put our lighting equipment to achieve the look the director likes.

This particular scene (rendering, Fig. 1) will require many layers of color with light coming from many different directions. As you begin to translate renderings into a lighting plot, keep in mind the elements of the designer's job description:

1. To create an environment in which the event will take place.
2. To make the actors visible.
3. To assist the audience in understanding the story.

Like all of the design jobs in the theatre, the lighting designer's work happens at the intersection of creativity and technical expertise, and that is especially true of this part of the process. It is the technical part—knowing what each type of instrument will look like when focused on the stage from the available hanging positions in your space—that enables the creativity. We'll address some of the basics of this knowledge in this article, but experience—ideally, the chance to work alongside an experienced designer at first—is the best way to acquire it.



Fig. 1. The designer's rendering for the robbery scene in *Carousel*.

We'll begin by making a shopping list of what the rendering is calling for.

1. An overall wash of dark blue light.
2. A slightly smaller wash of lighter blue light for the dock/acting area.
3. A system of light, from stage left, with a light blue color for light blue highlights.
4. Another system of lights from stage left for the "white" highlights. I put the word white in quotations because using actual white (no color) light on stage would read as amber against all that blue in the background. In reality, I used a very light blue (Lee 201) for these highlights.
5. A system of diagonal backlight from over the performers' shoulders from the stage right side. This will give the performers a bit of an outline to separate them from the dark blue background.

6. A system of amber light to give us highlights that are motivated by the oil lantern hanging from the pier piling.

7. A system, perhaps even two, of patterned breakups to create the mysterious shadowy feel this scene requires.

8. Billy's death special. A very bright, very "white" light from above and slightly back. (This light is not in the rendering, but I know it will be needed for the very next cue.)

Magic sheets

Now that we have our list, the demands of the rendering are not quite so overwhelming. We are able to deal with each needed element, one at a time. My next step is to draw small

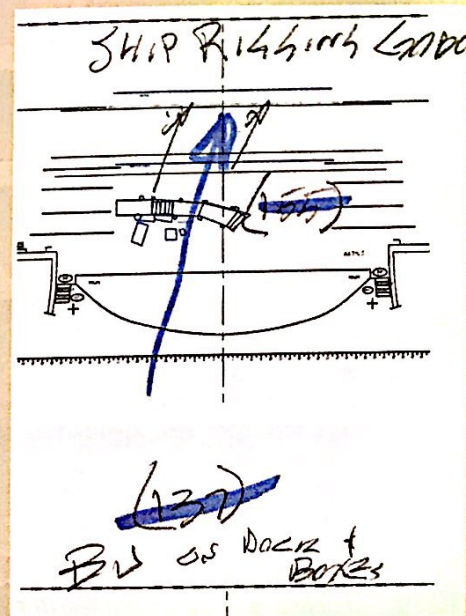


Fig. 2. A small "magic sheet" schematic helps the designer begin to visualize the light plot. Arrows and notes in pencil and blue marker show how lights are aimed and identify tentative channel numbers.

ground plans representing the scenery and the stage, on which I will sketch the placement and direction of lights for each item in the shopping list. These small ground plans, called "magic sheets," are a valuable tool for visualizing the final light plot.

The ground plans used to draw the magic sheets for Act II, Scene 2 of *Carousel* (one is reproduced as Fig. 2 above) were created in a computer aided design/drafting program and ganged together six at a time on a single letter-size sheet of paper. Even though I have these images in my computer, I prefer to print them out and use pencils for my preliminary work. (CAD programs will be discussed in the third article of this series.)

Shopping List		Channel s	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9	Area 10
			DSR	DSC	DSL	MSR	MSC	MSL	USR	USC	USL	US FAR
1												
2	Curtain Warmers											
3	Front VSR Warm		1	2	3	4	5	6	7	8	9	10
6	Front VSL Cool		11	12	13	14	15	16	17	18	19	20
4	Front VSR Cool		21	22	23	24	25	26	27	28	29	30
5	Front VSL Warm		31	32	33	34	35	36	37	38	39	40
7	Bax Warm and Bright		41	42	43	44	45	46	47	48	49	50
8	Bax Cool and bright		51	52	53	54	55	56	57	58	59	60
9	Diag Bax VSL		61	62	63	64	65	66	67	68	69	70
10	Diag Bax VSR		71	72	73	74	75	76	77	78	79	80
11	Sides VSL Warm			81			82			83		84
11	Sides VSR Cool			85			86			87		88
12	Sides VSL Cool			89			90			91		
13	Sides VSR Warm			92			93			94		
14												
15	Shins for dance VSR			97			98			99		
16	Shins for dance VSL			100			101			102		
17	Mids for dance VSR			103			104			105		
18	Mids for dance VSI			106			107			108		
24												
25												
26	Pattern Washes.											
27	Diag Bax breakups VUSR		121	122	123	124						
28	Diag Bax breakups VUSL		125	126	127	128						
29	Breakups on floor for path		129	130								
30	Colorful diag-bax pattern wash.				131	132						
31	Side breakup wash		133	134	135	136						
32	Breakups on boxes areas.		137									
33	Breakups on Chorus.		138									
34	Trees for backdrops		139	140								
35	Tree patterns around stage		141	142	143	144						

Fig. 3. A simple spreadsheet helps keep track of channel assignments as they're made.

I use these small magic sheets to help me figure out where the lighting units will hang and which direction they will point. I also begin to assign channel numbers to each of the systems at this point in the process.

The specimen magic sheet addresses item 7 on the shopping list. The horizontal rules represent the approximate locations of pipes. Arrows indicate the direction of the light. The numbers in parentheses (137, 155) are channel assignments. I'll also make notes to myself in the margins. The magic sheet is essentially a tool to help you organize your thoughts, not one to share information with others.

Preliminary channel assignments

Experienced lighting designers anticipate which channels are to be used most often, and which lights are used together, well in advance of the first

technical rehearsal. Spending a little extra time thinking about the overall control system at this stage will save a lot of rehearsal time. It is much faster to ask the board operator to bring up channels 1 through 12 at full, rather than having to press the "and" button several times to link together channels that aren't numbered consecutively. If you have a board with sliders that you control by hand, having your systems of lights together allows you to use a pencil to pull down a bunch of sliders at the same time. Years ago, running control systems that used large levers, the technicians would use broomsticks to push groups of levers up or down together.

Fig. 3 shows part of a spreadsheet used to keep track of channel systems. Note that each channel is keyed to an item in the shopping list. Remember channel 137 on the magic sheet? You will find it in Column D, Line 32 of

the spreadsheet, and on the same line, the note "breakups on boxes areas," which matches the text in the shopping list. All this cross-referencing may seem unnecessarily complicated. Believe me, it's not. Once I adopted these methods of tracking my thoughts, I found my time at the drafting table became more efficient, and I became much less prone to anxiety.

Fig. 4 shows an Excel worksheet that replicates the screen layout of the lighting console used for the production. The display screen layout for the computer board used for this production shows twenty-four channels across. This board could control over a thousand dimmers using 240 channels. Due to the resolution of the screen, it is not possible to fit 240 channels onto a single display at one time, so the board can "page" between different ranges of channel dis-

Front VSR Warm										Front VSL Cool										Front VSR Cool			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Front VSR Cool						Front VSL Warm								BAX Warm and Bright									
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
BAX		BAX Cool and Bright									Diag BAX VSL											Diag Bax	
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Diag BAX VSR							Sides VSL W				Sides VSR C					Sides VSL C			Sides VSR				
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Shins SL & SR						Mids SL & SR						High Sides SL & SR						Front FILLS					
97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Diag Bax BU VUSR				Diag Bax BU VUSL				Path		Colerful BU		Side BU Wash				Boxes		Trees		Tree Pattern Wash			
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
BackDrops/CYC								Mid Drops		Ship Scene: Dock Boxes,				Rotator Units			CC Units						
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
Red	N/C	Blue	Amb	Dark BL	Grn	Straw	Lt Blue	Straw						Caro		Scrim							
Costume Colors		Scrim Patterns		Blue Down	Blue Bax	Purp Down	Blue scrim	Blue scrim	Scrim Clouds	Side Wash	Side Wash	Dance	Rotators			Color Changers							
169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
Blue Green	Green										Black Scrim	White Scrim	White Scrim	Car		Scrim	A	A	G	H	D	D	I

Fig. 4. An Excel worksheet duplicates the display screen layout on the lighting console, making it easier to see channel assignment groupings.

play. I could easily see my first ninety-six channels—twenty-four across, four rows deep—without having to page to the second screen. Therefore, I decided to keep my primary wash channel numbers contained within the first screen and my textures (breakup patterns) and specials contained within my second and third screens.

During my channel assignment process, this Excel worksheet allows me to designate or band together banks of channels according to my needs. By using Excel's color-coding capabilities, I was able to keep track of what channel numbers I was using. This prevented me from accidentally assigning one channel to two different lighting systems. If you take a look at channel number 137, you will see that it is designated for "boxes," just as it was on the magic sheet and the channel system spreadsheet.

I use a printout of the design paperwork as a cheat sheet during technical rehearsals. These are useful when the designer or the board operator observes an errant channel level on the lighting console's screen and needs to determine its purpose. Now that we are able to control the lights through this system of channel numbers, we will build a map of where all the lighting units are going to go.

Choosing the equipment and figuring out where to put it

Lighting units project light onto the stage through a set of lenses. The optics of the lenses determine the beam spread, also known as the angle of light, which comes out of the unit and hits the stage. A unit with a beam spread of 45 degrees will give you approximately a twenty-foot circle from a distance of twenty feet. Differences in

beam characteristics are important considerations as you select lighting instruments and decide where to hang them.

One way to visualize beam spread is to compare the shape and size of the beam to different kinds of ice cream cones: sugar cones, waffle cones, wafer cones, and even large waffle bowls. How many sugar cones would it take to cover the same amount of area as one waffle bowl? Hypothetically, let's say that four sugar cones focused so that they overlap would have the same coverage as one bowl. If all of the lamps are the same wattage and the lights are hung at the same distance from the stage, the four sources of light together would be four times brighter than the single source, while covering the same area. Using four narrow beam lighting fixtures would also allow for greater control should one wish to focus tightly on a desired acting area.

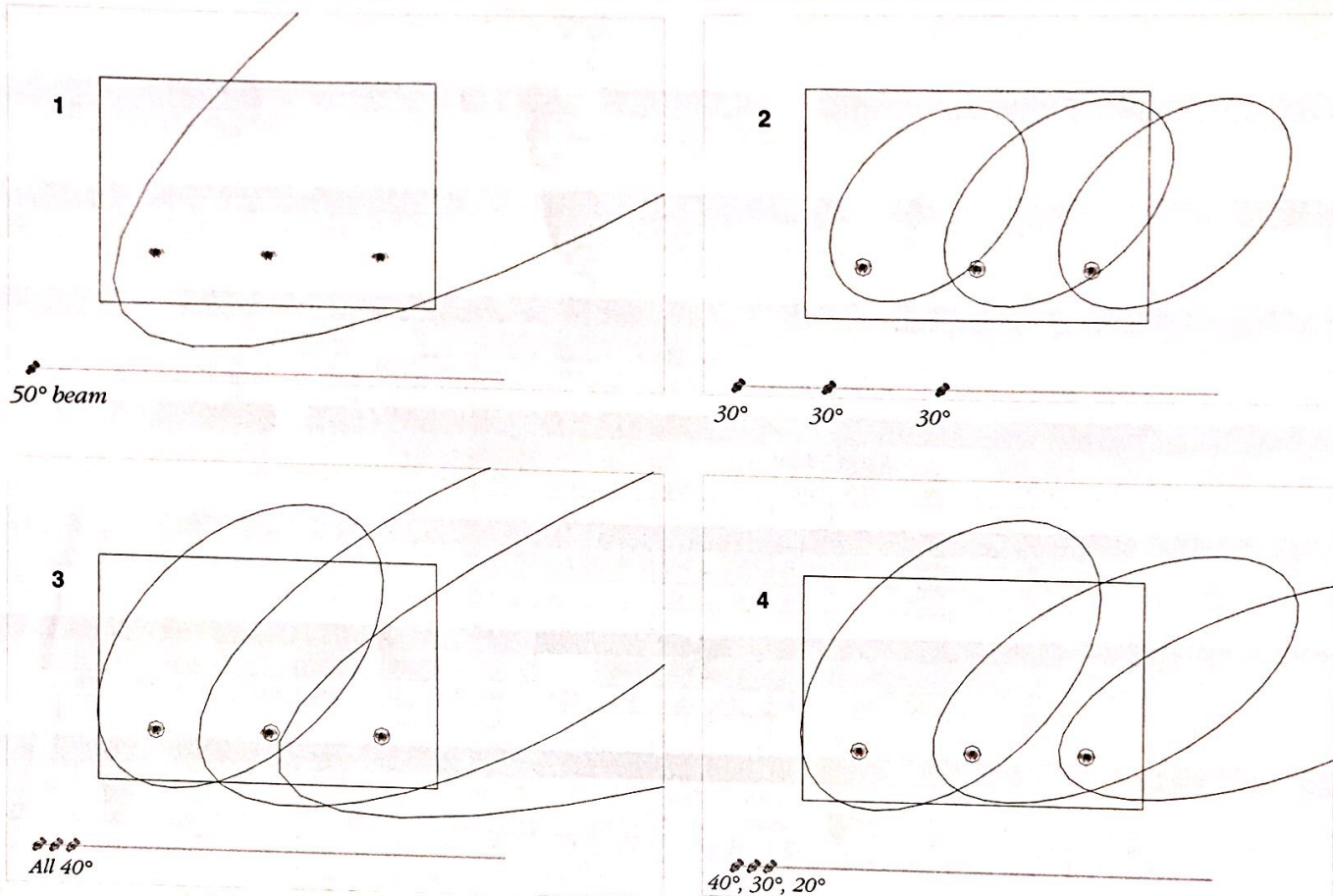


Fig. 5. Four ways to light three actors, some better than others.

The chart at below right from the Altman Lighting Company shows the approximate sizes of the circle projected if the units were hung thirty feet from the stage area you want to light. As you can see, when the diameter of the spot increases, the brightness (foot candles) decreases substantially.

Let's consider that we want to light three downstage acting areas, stage right, center stage, and stage left. The illustration in Fig. 5 represents a stage that is thirty feet wide by twenty feet deep. The lighting pipe shown is drawn at forty-two feet long and is located ten feet in front and fifteen feet above the front edge of the stage. Our desire is to light each area from a front diagonal position—let's say stage right. Because the stage right acting area is so close to our lighting position, we are going to want a relatively wide-angle lighting unit. The

center stage acting area will require a slightly narrower beam, since it is farther away. The furthest acting area, stage left, requires a more concentrated beam of light in order to maintain an even brightness with its neighbors.

The illustration shows a number of ways of lighting the three areas, some better than others.

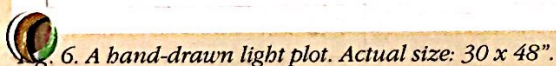
Panel 1 shows the use of a single unit with a 50-degree beam angle. Of the three actors standing in the light, the one stage right will be significantly brighter than the one standing all the way stage left. This type of "lighting design" should be avoided.

A single wide-angle lighting unit offers very little control and insufficient light output for most applications. They certainly do have their place in theatres with extremely low hanging positions or for the "near shot" used from side lighting boom positions.

The set of three lighting units in panel 3 are all the same 40-degree beam angle. Again, the actor at stage right will be brighter than the actor standing stage left. Notice that the circles of light increase in size (and diminish in intensity) the further they are projected.

The most consistent lighting would be delivered by the setup shown in

UNIT	DISTANCE	DIAMETER SPOT	FOOT-CANDLES
S6-20 (6x16)	30'	11'	254
S6-30 (6x12)	30'	15'	200
S6-40 (6x9)	30'	21'	132
S6-50 (4-1/2)	30'	28'	70



Panel 4 demonstrates a hybrid of sorts. This set of lights maintains the illusion that the light is coming from a single light source location, as the shadow for the performer stage left will end up being much longer than the performer stage right. The significant detail here is that these three lights do not match in their beam angle. The short throw unit covering the actor at stage right is a 40-degree unit. The light pointing toward center stage is a 30-degree unit, and the light covering the far end is a 20-degree unit. This is an extremely important technique to understand: using the narrower beam units for the farther throws ultimately balances out the

In the example above, I used three control channels for these three different acting areas. If we were to add a light for each acting area from stage left and another set of lights from the rear, we would need a total of nine channels. Add sidelight, rear diagonal light, down lights, etc. and we have the makings for multiple layers of lighting angles, shadows, and color that will allow us to paint our stage as designers are wont to do.

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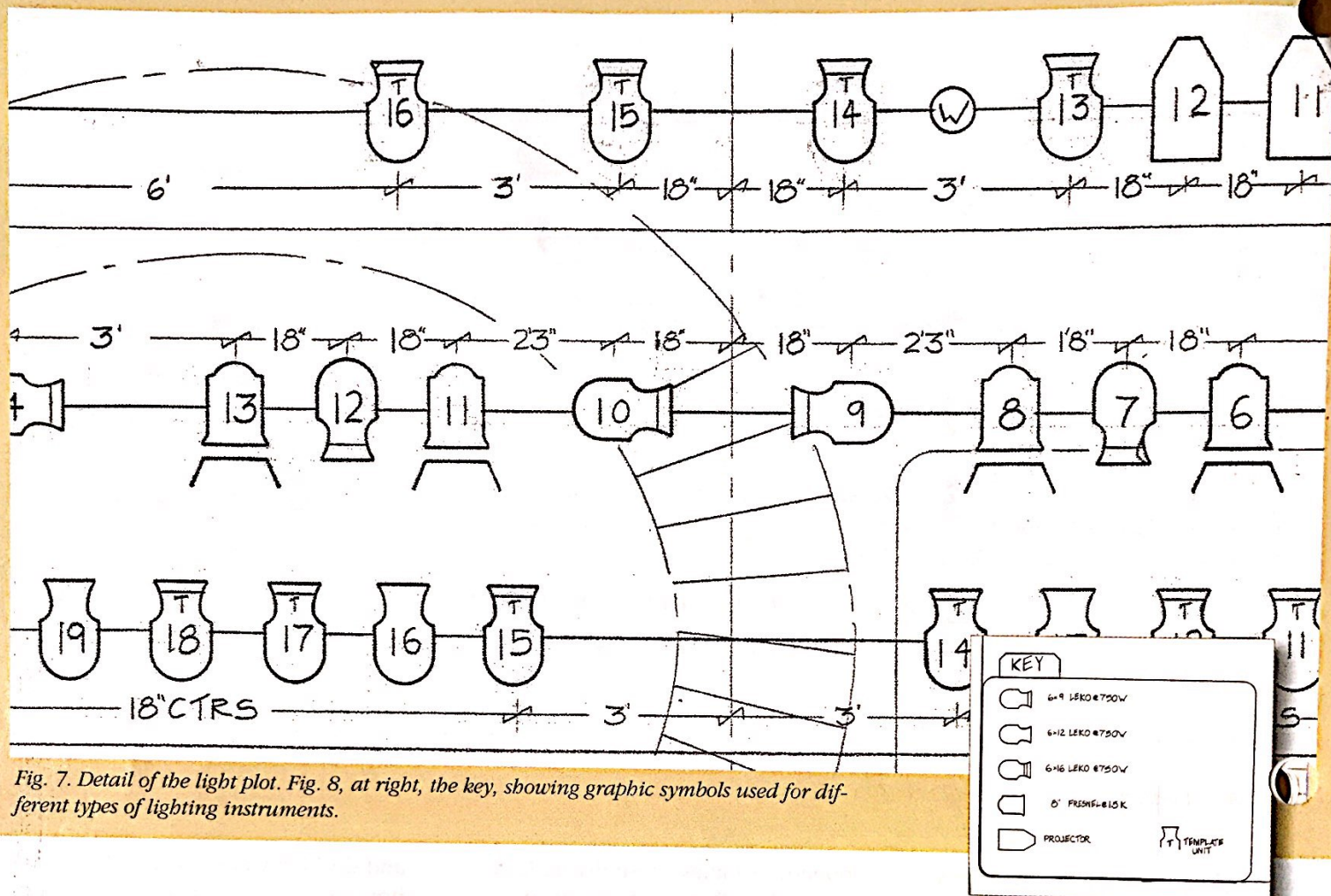


Fig. 7. Detail of the light plot. Fig. 8, at right, the key, showing graphic symbols used for different types of lighting instruments.

Fig. 7 is a close-up look at one small area of the light plot. Here we see a select section of three pipes with various symbols representing lighting units. The pipes are numbered from downstage to upstage as electrics and the lighting units are numbered from stage left to stage right. The symbols used to identify different types of units are identified in the key (Fig. 8), which is placed in the lower left corner of the light plot. You can use any symbol you wish—bananas, coconuts, or something more conventional—as long as your key guides the electricians to hang what you want, where you want it.

The rear-facing symbols on the second electric, numbers 8, 11, and 13, represent 8" Fresnels. These three units have an additional symbol indicating the desire to use barn doors. Many of the units have the letter T within the barrel, telling the crew that the units require template hold-

ers. Please note the curved staircase is drawn with a light touch pencil for reference only. The most important information on the plot is the units themselves, which are also the darkest objects. Another piece of very important information shown is the dimension between the units. While we could ask our electricians to pull out their scale rulers and measure for themselves, I believe that taking a little extra time during the drafting process to include the dimensions will increase the accuracy and speed of the light hang. The faster your crew gets your equipment in the air, the sooner you will be able to focus and start writing cues.

A section (Fig. 9) is a side view of the stage that shows how high the set is and what angles light will be cast from the overhead electrics. A section is vital to the lighting designer because it is the only tool that tells us if the beams might be too steep, might be partially

blocked by a tall piece of scenery, or, in the case of backlight, might be blinding the front rows of the audience. Both units in this image are 30 degrees and are focused on the performer. The section shows a problem: the backlight is going to fall into the front row of the audience. We will need to either focus it a bit more upstage, or we must plan on shuttering in a bit.

Hookup

The hookup is a list that contains a lot of information about each lighting unit we plan to use. We list the pipe name, the unit number, the channel number, the dimmer number, color, template and any other notes about each unit we wish to track. Using lined paper works just fine for simple shows. For more complicated shows a spreadsheet program is a must. Figure 10 is a part of a specimen hookup sheet for the production of *Carousel* we've been working on.

There's channel 137 again. See how much information is being communicated? The hookup shows that the light itself is unit no. 5 on the position called "Light Bridge 2." The light is an ETC Source4 36-degree with a 750 watt lamp. Under color it lists "N/C" (no color). The template slot needs two templates: R-208 + R-7760.

Turning the design over to the crew

We have arrived at the point when the lighting designer turns over responsibility for the execution of the design to the electricians, who will run the light hang. The head honcho of the electric crew is often known as the "production electrician" or "master electrician." It is this person's responsibility to take the lighting designer's equipment specifications and make it all work.

The designer has enough to worry about: visits to rehearsals, meetings with the director and other designers to discuss cueing, and so on. With the communication paperwork discussed here, lighting designers are able to communicate easily with the stage crew. After the crew has hung and plugged the equipment according to the paperwork you supply, you can call for any channel you need for a fast focus and quick cueing.

The moment of truth will come during tech rehearsals. Because the design can only exist as an observable phenomenon in the performance space, lighting designers often ply their craft under the gaze of just about everyone in the theatre. When we sit at the tech table, in the center of the audience, and the stage manager says, "lights go," an interesting kind of parallel speculation occurs. The lighting designer sits and wonders if the director likes the look. Simultaneously, the director stares at the stage wondering if the look is what the lighting designer actually intends to keep. If you

been following your own process and you have continually communicated with your director, then what pops up on the stage should be very close to what is expected. ▼

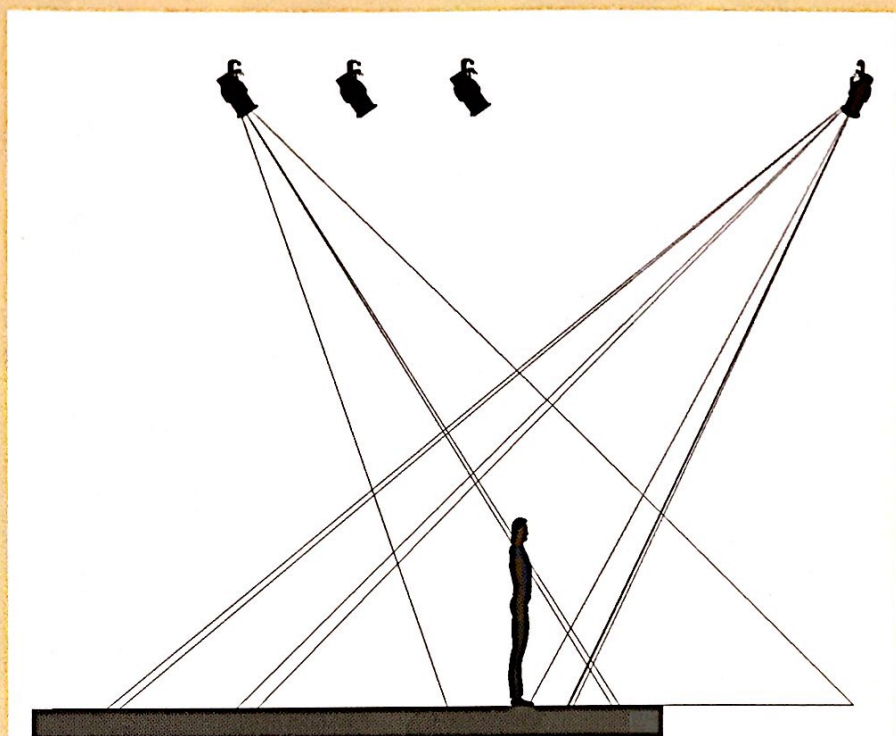


Fig. 9. Section view. This one reveals that the upstage instrument should be refocused or shuttered too avoid spilling light into the audience.

Carousel

Lied Center

Cell: 718-757-6661

CHANNEL HOOKUP

2/28/10 Page 1
carousel H4.h

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CONTROL SYSTEM A

Channel	Dim	Position	Unit	Typ/Acc/Watt	Purpose	Clr+T
(136)		LIGHT BRIDGE 2	1	S4-26deg 750w	BREAKUPS SIDES VSL	N/C, T-R-78221
		"	2	S4-36deg 750w	"	"
		#3 ELECTRIC	1	S4-26deg 750w	"	"
		"	3	S4-36deg 750w	"	"
(137)		LIGHT BRIDGE 2	5	S4-36deg 750w	DOCK BOX BREAKUPS	N/C, T-R-208+R-7760
(138)		#3 ELECTRIC	28	S4-26deg 750w	SHIP BOXES BREAKUPS	L-201, T-R-77228
		"	32	"	"	"
(139)		109 SL BOX BOOM 3	7	S4-19deg 750w	TREE TRUNK WASH	L-137, T-R-77100
		"	8	"	"	"
		115 SR BOX BOOM 3	7	"	"	"
		"	8	"	"	"
(140)		LIGHT BRIDGE 1	5	S4-36deg 750w	TREE TOPS ON BACK DROPS	L-137, T-R-77774
		"	27	"	"	"
		LIGHT BRIDGE 2	3	"	"	"
		"	4	"	"	"

Fig. 10. Part of the hookup sheet for Carousel.