SV/DMO

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LITTLE THEATRE LIGHTING DESIGN

An Interactive Qualifying Project Report

submitted to the Faculty of

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

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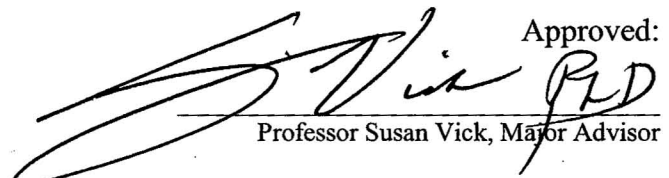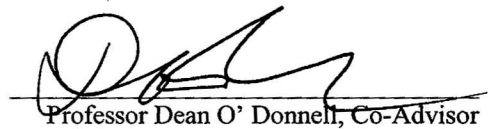Patrick Crowe   Lauren Ferrechio

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Abstract

This IQP has created a handbook that will allow students to gain an understanding of lighting and lighting equipment. By updating protocols and creating new space for equipment, we have improved the theatre's use as a laboratory space and facilitated its use for more academic purposes. Finally, by working on a production selected to perform in New York we gained knowledge that can be applied to lighting design at WPI.

Executive Summary

The goal of this IQP was to improve lighting design in the Little Theatre at WPI. Our team started this project by looking at everything the theatre had to offer and how we could improve it. While the Little Theatre is an amazing performance space, all the equipment needed for lighting design takes up space and the theatre lacked storage areas for all of the equipment. In an effort to improve the theatre in this way, our IQP added three new storage spaces. The first space was created by adding bottoms to the usher benches. This allowed them to also be used as storage boxes. The second space was created by rebuilding a shelf that had been previously used, allowing it to hold more equipment. The last unit is a rack that was built to hold cable. Up until now the stage pin cables used to connect the lighting instruments did not have a permanent storage location. This rack is an easy way to store the cables without them getting tangled or damaged.

Another improvement we made to the space was the addition of a lighting design called the Base Plot. This plot is the default lighting design for the Little Theatre and allows more freedom in how the space can be used.

The Little Theatre is not only a performance space but a laboratory environment. Our team set out not only to improve the theatre itself, but assist those using the space. To that end, we created a Lighting Design Handbook that will be available for students involved in theatre. This handbook gives students the information they need when working with the equipment and lighting designs in the Little Theatre.

While creating the Lighting Design Handbook, we found that there were problems with the Fire Alarm protocol for the theatre when trying to use haze or fog for a theatrical effect. This IQP improved these protocols and then tested them to make sure they functioned properly.

In addition to improvements to the theatre, our IQP also created the lighting design used for the preview performance of *French Vanilla* by Catherine Darensbourg and Elliot Field. This show had been chosen to perform in the Samuel French Off-Off Broadway Original Short Play Festival at the Chernuchin Theatre in New York. Creating the design for the preview performance, as well as working on the show in New York, allowed us to gain knowledge of lighting design that could then be applied to the Lighting Design Handbook.

Through our efforts we have learned many things about lighting design. Our new understanding of lighting informed our design of *French Vanilla* and gave us the experience to create our handbook. The work of this IQP team has not only allowed us to grow in our knowledge of lighting design, but will benefit students who wish to learn more about lighting in the Little Theatre and will be an aid to anyone working in the Little Theatre.

Introduction

Lighting is vital to a show. It provides shape and form to the actors, provides color and mood to a scene. Lighting design in the Little Theatre is a work that requires many hands and many hours, but with worthwhile rewards. Our experiences on this IQP have furthered our knowledge of theatrical lighting, and deepened our understanding of the Little Theatre space. We have come to a realization that lighting the Little Theatre is not about its apparent challenges. Lighting the Little Theatre is about its subtle and adaptive environment.

We have researched and tested several advanced and modern lighting techniques, ranging from color mixing to fog and haze effects. Some of our experiences went exactly as expected, while others initially surprised us. Taking this new information, we revised previous protocols and standards providing a baseline for lighting possibilities within the Little Theatre. These protocols and practices, when followed, should streamline the transition between shows that will use the space.

We have created a lighting handbook intended to teach novice designers and electricians the ins and outs of lighting the Little Theatre. This handbook is a starting point and should not be considered an exhaustive resource. Topics were omitted if they had no relevance to the Little Theatre. For example, intelligent lighting is not discussed in detail because the Little Theatre does not own intelligent lighting.

We present here all our collected experiences and work.

Base Plot

WPI's Little Theatre holds a variety of dramatic productions every year. Due to the many different kinds of productions, the lighting designs are constantly changing. This constant change presents a problem. When there is no show currently in production, the previous show's lighting instruments and board settings remain in the state they were in after strike. Therefore, it is difficult to use light for non-show purposes without being restricted to the work lights. In order to correct this problem our IQP has developed a lighting design called the "Base Plot."

The Base Plot is the default lighting design for the Little Theatre. It will be hung on the grid at all times, along with the current design, except when the current lighting designer needs to use all the instruments available. At the end of each performance the Base Plot lighting instruments will be re-hung in their original positions. This will guarantee that certain instruments will be on the grid.

The Base Plot provides a framework for lighting designers. The Little Theatre is a laboratory environment, and as such it is expected that most of the people working on lighting in the theatre will be inexperienced. The Base Plot provides a starting point that Lighting Designers can use. It will allow new designers to gain a feel for how much light an instrument throws. The Base Plot can also be used for non-theatrical events, such as speeches or announcements made by faculty and staff. Finally, the Base Plot can also be used in a classroom setting to demonstrate how certain types of lights look, what areas can be lit by certain lights, and how many lighting instruments it takes to light a theatre the size of the Little Theatre.

This IQP highly recommends that lighting designers incorporate the Base Plot into their designs. The Base Plot lights much of the playing space, with a focus on the area between the four pillars. These instruments will provide basic lighting that a designer may already need and

will also save time during strike because the instruments will not need to be moved back to their taped out Base Plot locations.

While this design is a good start for lighting designers, the Base Plot is not necessarily a complete theatrical design. The Base Plot will function completely for a classroom setting and for non-theatrical events, but it may not provide good light for a theatrical setting. These instruments are meant to be functional, not artistic. The lighting designer may also decide that his show needs exactly the light provided by the Base Plot.

The goal of the Base Plot design was to use the minimum number of instruments possible to light the theatre. While this saves time and energy when hanging the instruments, it makes three assumptions. The first is that the lighting instruments will be re-hung during every strike. Having a small number of instruments makes it more likely they will be hung and cabled correctly. Second, the design of the Base Plot also assumes that the audience will only be sitting in the two permanent seating banks. Each performance is different, and with the many types of possible stages (thrust, in the round, etc) that can be used in the Little Theatre there is no guarantee what type of seating arrangement each director will use. With this lack of knowledge our IQP group can only focus on the two permanent seating banks. This ties into the third assumption that the main playing area will be inside the four pillars. Due to the way the permanent seating banks are placed, as well as the position of the pillars, a natural playing area is drawn in the space inside the four pillars, and most actors will gravitate to that space. Therefore, given that the design calls for a small number of instruments, the natural decision is to place more light on the area that will be used the most.

When all of these assumptions are looked at, it is understandable that more lighting instruments will need to be added and designed for a specific show to fully light the performance. These instruments are not used in the Base Plot, because doing so would create a

hassle during strike to relocate and focus, negating the goal of having a small number of instruments.

Overall, this design facilitates the use of the Little Theatre as a laboratory setting as well as for other academic purposes.

Proposal for Little Theatre Lighting Improvements

After consulting with a representative from ETC we have considered many different options of what lighting instruments and accessories would be useful for WPI theatre. We have weighed the strengths of each light, and have selected what we believe most useful and appropriate to WPI theatre.

At this point all the current lighting equipment is only two years old and is in very good condition. It does not seem like the best idea at this point in time to purchase new lighting instruments unless they are a different type than we currently own. The Source Four ellipsoidal has a line of interchangeable barrels that can change the size and throw of the beam. The barrels that would be best suited for the Little Theatre would be the new 70° and 90°. These new barrels can be bought a la carte or with an ellipsoidal.

Buying a barrel separately from a light presents a new issue. Currently, all barrels reside in a lighting instrument, and purchasing new barrels creates a surplus. These new barrels must then be stored safely.

The new Source Four enhanced definition lens tube delivers a crisper beam and sharper edges. This clarity and fine detail is ideal when using a gobo.

Equipment from ETC can be purchased three ways: with the whole fixture; with just the barrels; with only the internal lens. Costs vary based on how much of an instrument is purchased. At this time we recommend that WPI does not purchase just the lens for that increases the risk of breakage.

Another new product line from ETC is the High Intensity Discharge (HID) family of fixtures. These lights get nine to ten thousand hours of lighting instead of the normal two to three thousand. However, these fixtures do not respond well to dimmers. The HID product line was developed with near constant use in mind, such as in architectural lighting or in a retail

establishment. Despite their exceptionally long life, these lights are not recommended for WPI theatre. They are not meant to be used with dimmers, thus making them inadequate for theatrical lighting.

The two types of barrels we have in the Little Theatre are a 50° and 36°. ETC has developed an adjustable degree barrel via two internal lenses. These lenses can be manipulated from outside the light via a degree adjustment knob. The two current products can cover from 15° – 30° and 25° – 50°. The 25° – 50° would be better for the Little Theatre because as the beam angle increases the beam widens and has a larger coverage. The 15° – 30° beam would be too small at the distance for our grid.

On the market today there are many barrel attachments available. They range from simple top hats all the way to color mixers and gobo rotators. We have a limited supply of accessories, owning only one iris, five barn doors, various gobos, and gels. Investing in new accessories would help enhance the lights that WPI already has. After talking with some lighting designers, they have suggested that more barn doors would be a good investment. When working on a show barn doors are used sparingly, since there are so few to begin with. Top hats and half hats are useful for restricting a beam of light to a certain degree. This effect is especially useful for theatre in the round. There is an alternate top hat with a frame track at the end for gels. This helps to extend the life of the gels and restrict the beam. The half hat can also be used to restrict the beam on one side which would be a great help.

Figure 1: Different barrel degrees and their effects on light beams
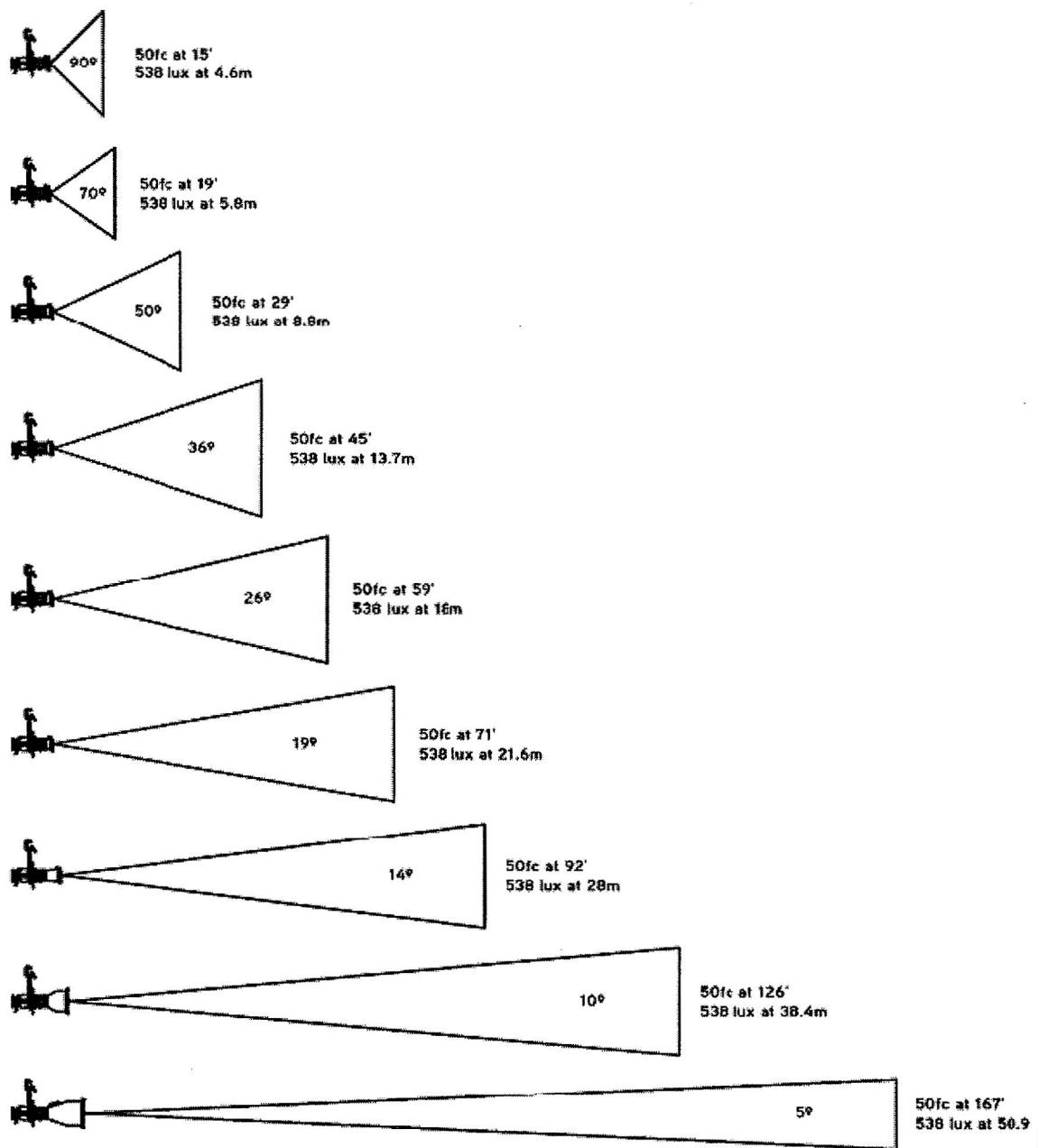
In this current age of technology, even lighting designs have taken to the digital age.

Through the many uses of computer aided designs and appropriate add-ons, many professional

lighting designers in the field today use computer aided design. In order to bring this ability to

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[1] ETC website. http://www.etcconnect.com/minisite/sourcefour/metrics.html

WPI theatre, the IQP group had created a full model of the Little Theatre in CAD. With the proper programs this can be imported and used as a basis for lighting design. To further facilitate the use of this model this IQP recommends that HU&A acquire a newer version of the Vectorworks software.

Our IQP feels that this would be a worthwhile expenditure to improve the Little Theatre.

What	Quantity	Cost	Total
Barndoors	5	37.20	186.00
70 barrel	5	200.88	1004.40
5 barrel	1	284.05	284.05
high definition barrel	1	180.00	180.00
PARnels	8	187.68	1501.44
TOTAL			$3155.89

Our Board and the Upgrade

The lighting board currently in use in the Little Theatre is an ETC Express 125/250. More specifically, our board is an ETC Express 125, because our board supports 125 accessible channels. The 125/250 in the full description specifies that it is possible for the board to be upgraded after the initial purchase. When considering upgrades to our overall lighting system, the ability to control more channels is preferable. We can upgrade our existing board for less than the cost of purchasing a newer board. The upgraded board would be capable of handling more intelligent lighting, fog and haze systems, and DMX controlled equipment. Furthermore, this upgrade avoids the problem of having a surplus lighting board. For $1800 we could upgrade our lighting board and this board will remain useful for years to come.

To get the upgrade, ETC has to service the board and perform a hardware update. ETC however will not accept a board directly sent to them, they prefer to work though a certified distributor. The authorized distributor in the Northeast is Barbizon lighting (http://www.barbizon.com). To upgrade our lighting board, we will need to ship our board to Barbizon, and they will handle the logistics of the upgrade. Once the upgrade is complete Barbizon will ship us an invoice and our upgraded board. The IQP recommends that Drama/Theatre and Masque upgrade the board.

Designing French Vanilla

With *French Vanilla* accepted into the Samuel French Off-Off Broadway Short Play Festival, a preview performance was held in the Little Theatre before the production moved to New York. As part of this IQP, we designed and implemented the lighting designs. Aptly named *Two Scoops of French Vanilla*, the actors performed the show twice for the audience. The first showing was our design for the Little Theatre, and the second mimicked the lighting that would be available to us at the Chernuchin Theatre, The Samuel French venue. Both of our lighting plots and plug charts can be found in Appendix F-L.

Being a fifteen minute theatrical performance without much call for special effects, the director decided not to add many extra cues for fear of looking cheesy. The house lighting was designed to direct the audience to the one seating bank open as well as create an inviting atmosphere. Using all Fresnels, we created a light wash of pink, orange and green blending to appear as sherbet over the stage, while the seating bank was lit with a "creamsicle" white and amber wash. Accenting the two set pieces, a table and chair center stage, were two ungelled 36° ellipsoidals shuttered in a square shape. When house was brought to half to signal the show was about to begin, the two special set instruments were brought up from 30% to 50%, transitioning the focus from the audience seats to the performance stage.

Figure 2: The seating with the house lighting
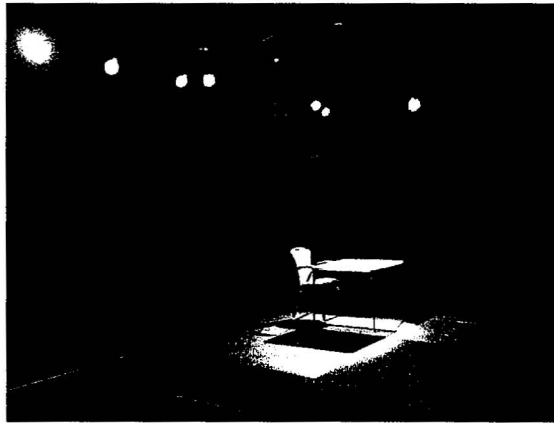
Figure 3: The house lighting on the stage area

A quick blue-out followed the house cues, a very faintly lit blue stage gave enough light so the actors could take their places backstage without being in complete darkness. Once everything was set, the full stage lights went up. Four pairs of 50° ellipsoidals with warms and cools provided the flood of front light. Four Fresnels with matching warm and cool side light complimented with the front light to give the actors dimension while evenly covering the entire stage with light. Backlight was provided by the pink, orange, and green house washes because they were focused as such. This separated the actors from the set, creating multiple planes.

Figure 4: A look at the French Vanilla *design in the grid*
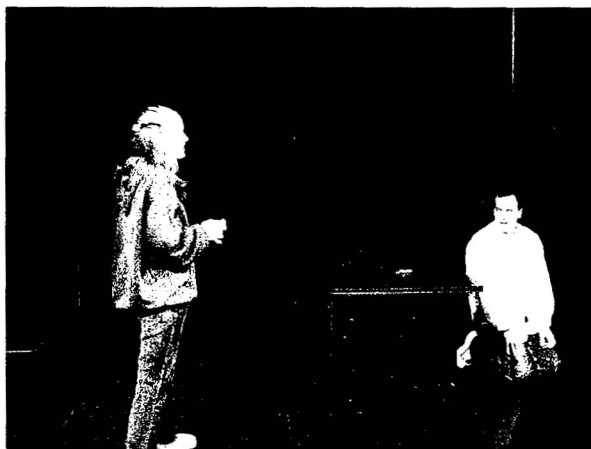
Figure 5: Sara Strecker (left) and Christopher Osborn (right) performing in the Little Theatre
French Vanilla *design*

For the majority of the show, one cue provided a bright wash over the whole stage that replicated the size of the Chernuchin. This allowed actors to get a feel for how much space they had to play in. Towards the end of the performance when the characters of Sarah and Chris realize that they are romantically interested, a slight change occurs: the pink back light was brought up and the lit area focuses on the two actors. Chris is then alone on stage with the Haagen Dazs, but makes a quick exit when it occurs to him what "French vanilla" means. The empty ice cream container is left on stage, and one down light is shuttered for it. The final performance cue is a special on the container.
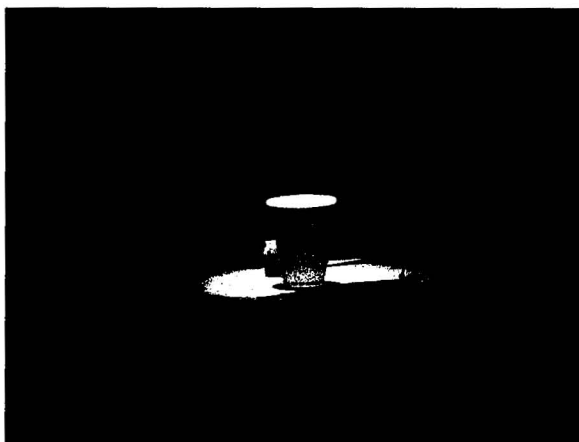
Figure 6: Haagen Dazs Special

The special faded into another blue-out, and then all the instruments were brought up to full for the curtain call. After bows and exits, the light transitioned into the Chernuchin design.

Preparing the actors for the festival lighting in the Chernuchin involved lighting the stage, but with no creative cues or specials because they would not be available in New York. Since the Base Plot was hung along with the Little Theatre design, we decided to use what was already available to us in the grid. The Chernuchin offered light, but no gels other than warm or cools, and the cues available were house to full, half, or glow. Our design was focused to only one seating bank to prepare the actors for a uni-directional audience. Our design therefore consisted of the front light from the Little Theatre design for *French Vanilla*, and to set an example for future designers, we incorporated the Base Plot washes. Together, it created a general wash over the stage, while still following the theatrical convention of warms and cools.

Figure 7: Sara Strecker(far left), David Stechmann (center), Christopher Osborn (right) and Lindsey Lucier (far right) perform under the Chernuchin Theatre design

Figure 8: Linsdey Lucier (left) and Christopher Osborn (right) in the Chernuchin Theatre design

The preview performance went smoothly, with a noticeable difference in feel between our intimate space's design, and the blandness of the Chernuchin design. When we arrived in New York, it was startling to see the difference between our design and the actual Chernuchin. We had made sure that there were no shadows or dark spots on the stage, and had programmed a series of cues. The left side of the Chernuchin's stage was considerably darker than the right, and the available cues were manually controlled on three submasters. We were fortunate to have the opportunity to design for *French Vanilla* and accompany the production to New York.

Fog and Haze

Our Haze Experience

To document lighting effects we were creating in the theatre, we agreed that using haze in the air makes for excellent photos because the beams become visible. We followed the protocols set forth by the previous IQP. Chief Martunas granted permission, and the dispatcher was on the phone with Lauren as she switched into bypass mode. The photos were taken and the haze then cleared.

We overlooked one thing. The ventilation system we thought was off switched on and took in some haze. This tripped the first alarm that tests the air in the vent for particles like smoke. With this alarm tripped we knew there was nothing we could do to prevent it from sounding when the system was brought back to normal. Lauren called the dispatcher again and informed her that the haze had cleared, but because that alarm had been tripped while silenced, the alarms would go off when the system came out of bypass. We were advised to just switch it and that it would be handled as any other fire alarm. WPI police followed by Worcester Fire responded, agreed that it was a false alarm and the WPI officer reset the alarms.

After a series of emails and a meeting with Officer Jay Dylewicz and a plant services electrician, it was determined that an officer should have responded when we requested one, and that an officer on duty can reset the alarm if one has been tripped in bypass mode. The complete step by step protocol for the bypass system has been retyped to include this, and will be hung in the booth.
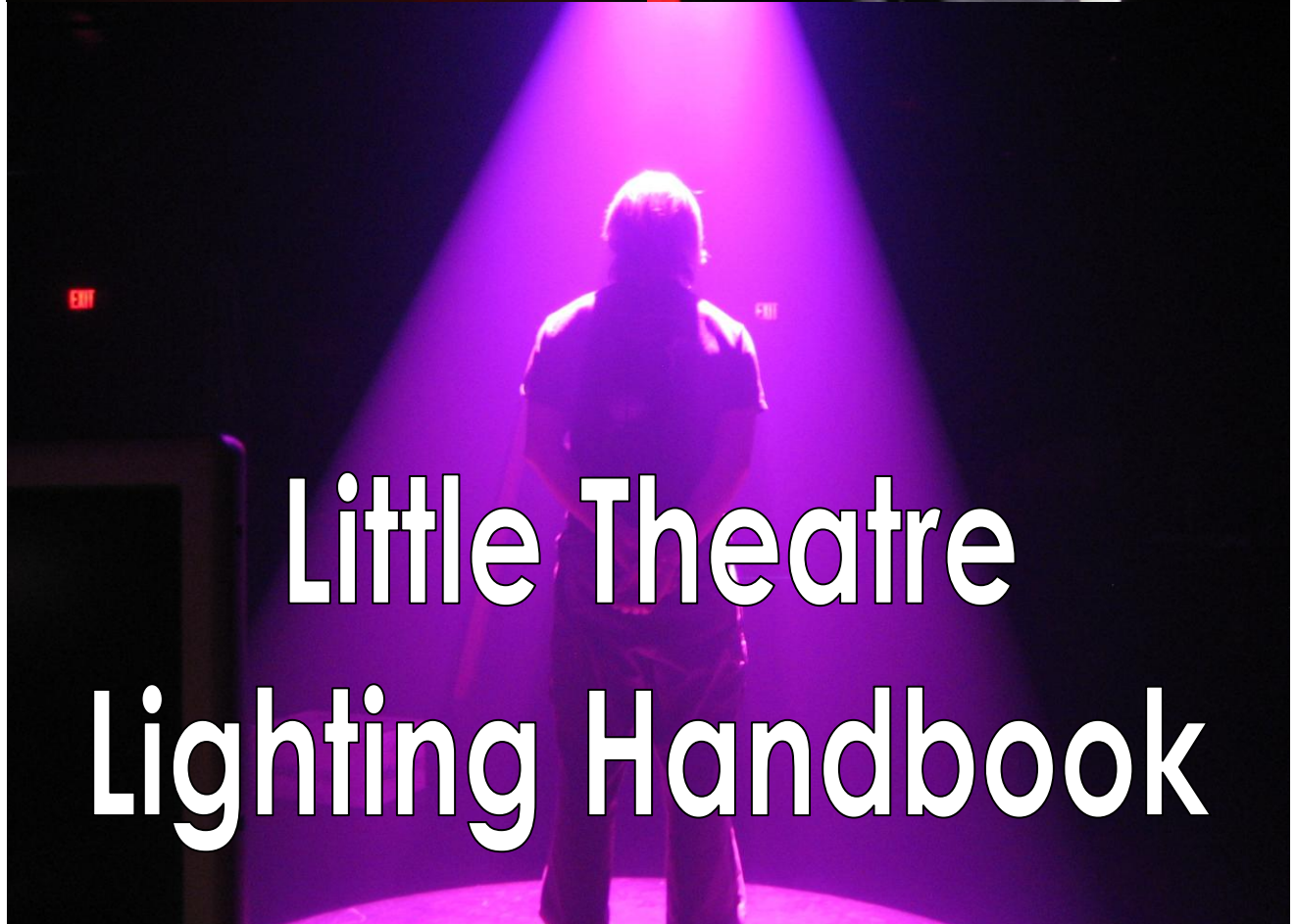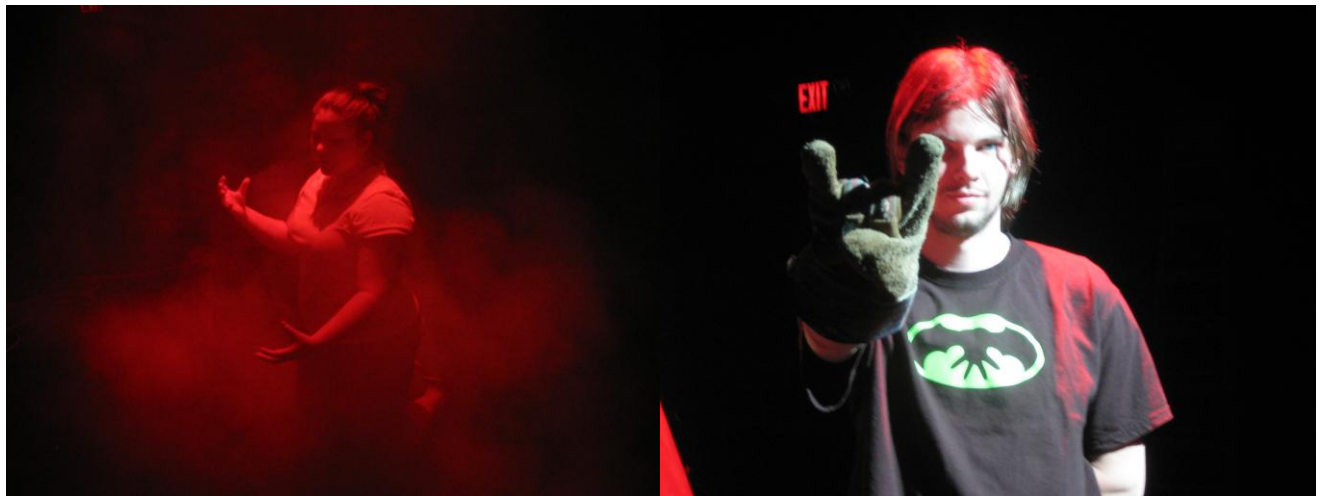
Little Theatre Lighting Handbook

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Introduction

An actor walks onto the stage wearing a finely detailed costume. The set behind him is intricately painted and the sound of birds chirping fills the theatre. There's just one problem – the audience can't see anything. This is where you come in.

This handbook is a resource guide for lighting in the Little Theatre. Some techniques work well in the Little Theatre and others do not. Reading this guide will familiarize you with the theatre and give you grounding on what techniques work in the Little Theatre.

Don't worry if you haven't worked on lighting design before. This guide expects that readers haven't worked with theatrical equipment before. Even if you've worked on lighting design before there are protocols and practices outlined in this handbook that you need to follow and other crucial information for lighting the Little Theatre.

This handbook is divided into six sections: basic skills, design theory, design implementation, Little Theatre considerations and protocols, appendices, and a glossary. Basic skills gives a quick rundown of lighting instruments and how to use them. Design theory covers much of the theoretical information needed when working on a show. Design implementation talks about putting your design on paper and gives information on hanging and cabling. Little Theatre Considerations and Protocols covers the Ten Commandments of Lighting in the Little Theatre, and other important rules you need to keep in mind while working in the theatre. The Appendices contain charts and other important information. Finally the glossary of terms introduces those not familiar with lighting to the lingo.

With that said, welcome to lighting in the Little Theatre.

Design Basics

Positions Related to Lighting

Lighting a show is a team effort. Several different production positions are a part of the process. Here we've created a quick reference guide on what each position's responsibilities are. This is not, however, set in stone. These descriptions only give an idea of what each position should do and can do.

Lighting Designer

The Lighting Designer, commonly referred to as the L.D., is responsible for the artistic design of the lighting. After reviewing the script and talking with the director, the lighting designer takes his or her vision and figures out what instruments, gels, gobos, and other special effects are needed to make it a reality. Using either a stencil and paper, or more advanced software and CAD models, the designer plans for the type, location, and direction of each instrument. The types of plots and charts made are explained later, but in short, it is the lighting designer's job to put an idea on paper for the electricians to implement. In many non-academic theatres, the lighting designer's job is done once the final design is handed over to the Master Electrician. However, at WPI, the lighting designer is usually at light hangs and focuses, working as an electrician.

Master Electrician

The Master Electrician, also known as the M.E., takes the lighting designer's design and directs the hanging, gelling, focusing, and cabling of the instruments needed. He organizes which instruments are plugged into each box, and keeps records of these plug charts. The master electrician is also in charge of organizing the electricians. Once the design is hung and

focused, the master electrician can program the board with submasters and cues for the show. Frequently, the master electrician operates the board during shows.

Electricians

Electricians are the Master Electrician's crew. They are everyone else involved with implementing a design. They are the people on the ladders hanging the instruments. When working, they may be asked to find the gels being used, walk around the stage during focus, or climb ladders to adjust instruments. They also plug in the instruments and cable them very neatly.

Little Theatre Squad: Lighting

The Little Theatre has a small squad of students in charge of the everyday workings of the space. The Little Theatre Squad member in charge of lighting manages lighting equipment in the space. If there is ever a question about the equipment owned by the Theatre itself, how it works, how it can be fixed, how to plug it in, etc., the Squad Member is the person to talk to. This is a work-study position that reports directly to the Humanities and Arts Department, Drama/Theatre division, and is paid to maintain the theatre. The Squad Member works with each show as a liaison to the space.

Technical Director

A Technical Director, also know as T.D., is responsible for every technical aspect of the production. The Technical Director is a unique position within the production hierarchy because he is in charge of a lot, but has no specific job. Usually, the technical director ends up being a safety officer during light hang and set build. A good technical director is very experienced in all technical aspects of theatrical production and can get something done when the producer

needs it done, but doesn't know how exactly to do it. To make a simple analogy, a Technical Director is to the Producer as the Master Electrician is to the Lighting Designer.

Vice President: Master Electrician of Masque

In the past, the Vice President: Master Electrician, or V.P.M.E., took care of what few lighting instruments and cable Masque owned, with the rest of the equipment being rented from LNL, however with the opening of the Little Theatre, the job has changed a little. The Vice President: Master Electrician is now a mentoring position. If either the lighting designer or the master electrician for a show needs advice on how to approach some part of their jobs, the Vice President: Master Electrician exists to answer those questions.

Producer

Oversees all aspects of the show except related to the creative decisions, which are the responsibility of the director.

Director

Artistically in control of the show, directors work with designers to create an overall feel or look to the show. The driving force behind the show is his vision.

Set, Costume, and Other Designers

Set designers design the sets for shows; costume designers, costumes. These positions should both work with the lighting designer closely in order to work out any possible conflicts. While a good design of any kind does not overpower the rest of the show, there are frequently important subtleties that can only be brought out if all the designers work together.

Basic Skills: Lighting 101

In this section you will learn all the in and outs of the lighting equipment that the Little Theatre has to offer.

Equipment

At this point in time the Little Theatre has two different types of lighting instruments.

Figure 9: An Ellipsoidal

Figure 10: A Fresnel

General

This information applies to both ellipsoidals and fresnels

Yoke

This is the main support for the light. It connects the light to the c-clamp. The safety cable is run trough the yoke and then the grid because of the durability and ideal location of the yoke. Where the yoke connects to the light, there is the "yoke locking knob" that controls on axis of the movement.

Figure 11: "Yoke locking knob" on an ellipsoidal

Figure 12: "Yoke locking knob" on a fresnel

By loosening that knob the lighting instrument can cast light in many different areas and at different angles.

Power Cable

Both fresnels and ellipsoidals in the Little Theatre use stage pin connectors for power and all the plug boxes in the grid are wired for stage pin. Stage pin connectors have three gold colored pins, two sit close together and a gap runs in-between the third. When hanging a lighting instrument it is best to leave the instrument's power cable loose so that when a instrument is being adjusted and/or focused there is enough slack. Over time the pins on the stage pin connectors lose their hold. This is because the pin is cylinder with a slit about half way down it and over time the two halves of the pin get pushed together. To correct this, a pin splitter is needed. The pin splitter forces a piece of metal in between the two halves and moves them apart. At the top of the pin splitter is the pin cleaning tool. Just insert the one pin into the hole and let the needles clean it out. There have been times when the lighting designer has needed to plug in instruments that do not have stage pin adapters. Because of this, the Little Theatre has stage pin to Edison connectors.
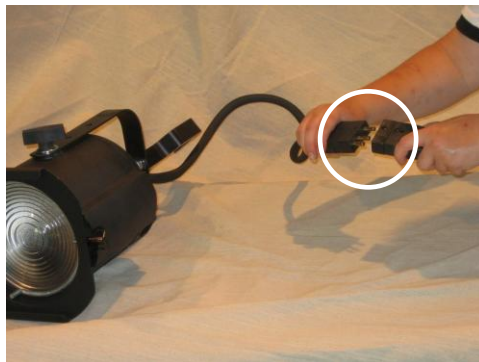
Figure 13: Stage pin connectors
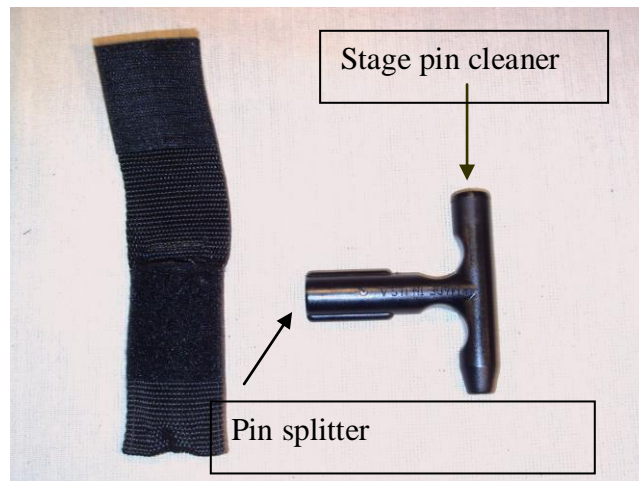
Figure 14: Stage pin splitter

The Safety Cable

Before any instrument gets hung on anything it must have a safety cable. This is very important. This cable ensures that if the light, pipe, and or anything fails or causes the instrument to fall that it will not endanger anyone below.
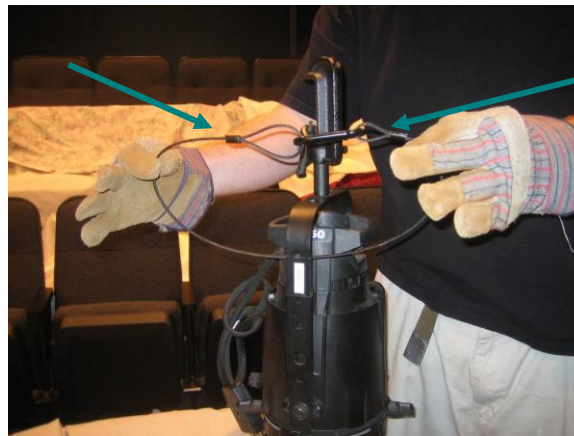
Figure 15: Safety on an ellipsoidal

Figure 16: Safety cable

This small cable can hold a substantial amount of weight and can prevent harm to the instruments and to people. There are some points that everyone should keep in mind about the safely cables and how you use them.

- Never hang an instrument without a safety on it.

- Never leave an instrument up in the grid without a cable.

- There are 100 instruments and 122 safeties: every instrument is required to have one.

- Do not step on the safeties. This presses foreign objects into the cable and weakens the cable

- When hanging a lighting instrument, hook the C-clamp on the pipe and then secure the safety

- When there is not a safe location for the safety, such as the end of the grid where a light hanging from its safety is liable to slide off, secure it to another light that is safely located

The Ellipsoidal

An ellipsoidal is one of the larger non-automated lighting instruments in theatre lighting. This instrument has become an industry standard in lighting for it versatility and its success over time. All the ellipsoidals that the Little Theatre has are made by Electronic Theatre Controls. Below is a complete breakdown of the Source Four ellipsoidal (from the ETC manual).
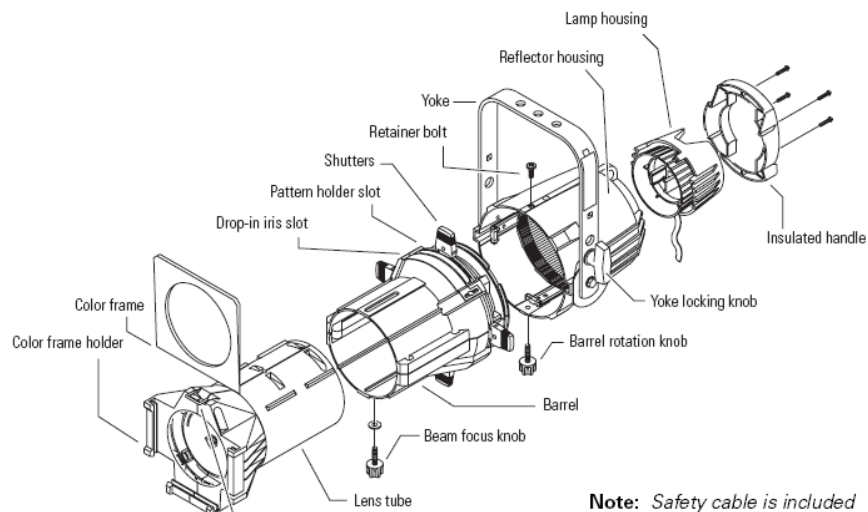
Figure 17: Breakdown of an Ellipsoidal[1]

 Ellipsoidal breakdown

The next section will cover how to manipulate the Source Four ellipsoidal. The Source Four ellipsoidal can be turned and positioned in many different ways to help meet lighting needs.

C-clamp

The c-clamp is used for keeping the instrument up in the grid. It also controls some of the movements of the instrument. On the c-clamp there is a small bolt called a set screw that when loosened allows the c-clamp to swivel and move up and down.

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[1] ETC Source Four manual

Figure 18: C-clamp

Figure 19: Set Screw

Change a Lamp

When changing the lamp in a lighting instrument, anyone touching the lamp must wear the white gloves found in the booth. This is very important because if any amount of oil from a person's hands, no matter if they have washed their hands, gets on the lamp when the instrument gets turned on the oil will heat up. This causes the heat to unequally distribute over the lamp and can cause the lamp to break. To actually change the lamp

- Make sure the instrument is not connected to a power source

- First stand the instrument up and move the yoke out of the way.

- Then unscrew the gold colored screw and remove the back of the instrument. Watch out for the power cable connected to the back piece that you have just removed.
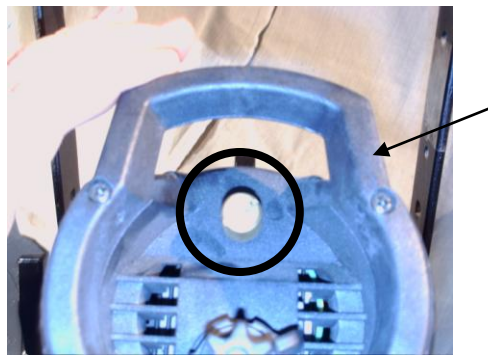
Figure 20: Casing Screw

Figure 21: Lamp

- Then with your white gloves on, remove both copper braces by pinching the end without

  the hinge and lifting.

Figure 22: Bass holders, where to pinch to remove

- Then pull the lamp out carefully.

- Put the new one in, replace the braces and close the instrument up the same way it was

  opened.

Shuttering

On the Source Four ellipsoidal there are four shutters that help to manipulate the light. When all the shutters are completely in no light will emit from the instrument and when they are all the way out a full beam with be present. With the shutters someone could distort the beam in many different ways and make different shapes, for example squares, triangles, and half moons. Keep in mind that when using the shutters the beam with have a flat side to it. If you are trying to make this smaller, try an iris. The shutters are very easy to move, they slide in and out of the instrument. Figures 23 through 29 show different shuttering examples.

Figure 23: Ellipsoidal shutters
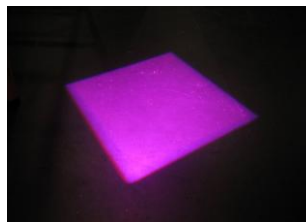
Figure 24: Shuttered square

Figure 25: Internal shutters (Square)

15
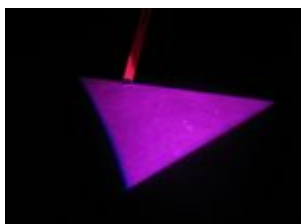
Figure 26: Shuttered triangle
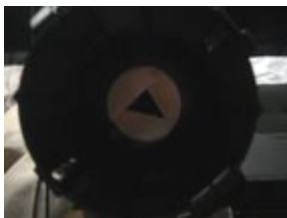
Figure 27: Internal shutters (Triangle)
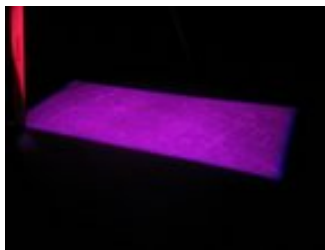
Figure 28: Shuttered rectangle

Figure 29: shuttered half moon

Gel Frames

On the front of the barrels of the ellipsoidal is a track that a gel frame can be mounted on. A gel is a piece of polymer that is colored and when mounted in a frame can change the color of the beam emitted from the instrument.

- First cut or find a gel that fits in the frame. When cutting, take the frame and trace around it.

- Then slide the gel in to the frame.

- Next, undo the latch by sliding it to one side and swinging out.

- Finally side the fame on to the track closest to the light. The furthest track is for larger barrel accessories.

Patterns/Gobos

Patterns, also known as gobos, are metal disks that get inserted into a lighting instrument and break up the beam, often into a pattern. Patterns can only be used in lighting instruments that have a focus point, such as ellipsoidals. They are useful when trying to set a mood or give an idea of time and place to an audience. All patterns appear black and white. In order to change the color a gel must be placed on the light.[2] The Little Theatre has several different gobos which can create effects ranging from simply projecting a window to creating a wall full of stars. Gobos can also be custom made, either by a professional company or by the current lighting designer. For example, for New Voices 24 a gobo was made to look like the Batman symbol. The gobo holder gets inserted above one of the shutters on the ellipsoidal and pressed all the way it.

---

[2] "What is a Gobo?" Star Light and Magic, Inc. http://www.starmgc.com/gobowhat.html (accessed on June 16,2007).
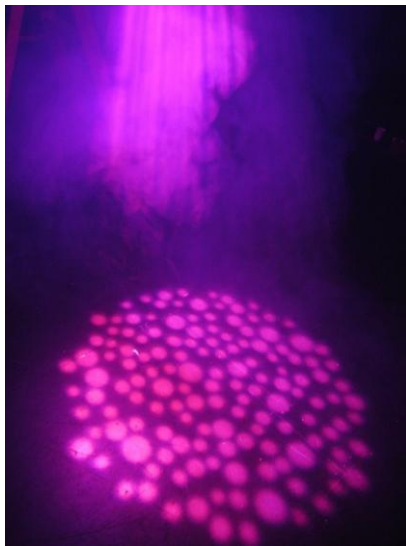
Figure 30: Bubble gobo

Figure 31: Gel frame half in a ellipsoidal

Figure 32: Gobo

Figure 33: Gobo Holder

Iris / Other Larger Inserts

The iris is another lighting tool much like a gobo. It can control the beam size from full size to a pin point. The iris is inserted in the same place as a gobo but due to the size differences a cover must be removed.

Figure 34: Iris (closed)

Figure 35: Iris (open)

- Remove the cover with a Philips head screwdriver.

Figure 36: Cover and screws (still on)

The cover prevents dust and dirt from entering the instrument while it is not being used.

Figure 37: Cover and screws (removed)

- After the cover is removed, slip the iris in but be careful it only goes in one direction. If

  it resists, try wiggling it back and forth.

Figure 38: Iris half in the ellipsoidal

- After it is in all the way, reattach the metal cover and make sure to leave some room so that the lever that controls the iris can move.

Figure 39: Iris fully in an ellipsoidal

This slot also accommodates various other lighting accessories such as glass gobos and color mixers but at this time the Little Theatre does not have any.

Top Hat and Other Barrel Accessories

In the lighting industry there are many different accessories that attach to the barrels to encase or manipulate the beams. To attach a barrel accessory, lift the latch and slide the accessory on the farthest track, and then put the latch back**.**

Barrels

The Source Four ellipsoidal product line has interchangeable barrels to increase their flexibility in lighting. Currently we have two different types of barrels in the Little Theatre, 50º and 36ºs. As the degree of the barrel increases so does the spread of the beam and the area covered. To change a barrel of an ellipsoidal, first:

Figure 40: A 50° and a 36° barrel side by side.

- Locate the knob the side of the barrels.

Figure 41: knob to release the barrel

- Remove the knob be careful because that is all that holds the barrel in.

Figure 42: Ellipsoidal without the barrel

- Slide the barrel out and insert the new one.

- Make sure when putting the barrel back, line it up on the barrel track.

Fresnel

   The Fresnel is a smaller instrument that is used primarily to throw light over a larger area on the stage. The Fresnel lens was invented by a French scientist developing lenses for lighthouses. These lenses are so efficient that many lighthouses still have their original segmented lenses[3]. In theatre, the Fresnel is used for short throws and soft edges. The Fresnels that the Little Theatre has are all make by Altman Lighting Co.

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[3] Charles I. Swift, *Introduction to Stage Lighting: The Fundamentals of Theatre Lighting Design*. (Colorado Springs, CO: Meriwether Publishing Ltd., 2004), 10.
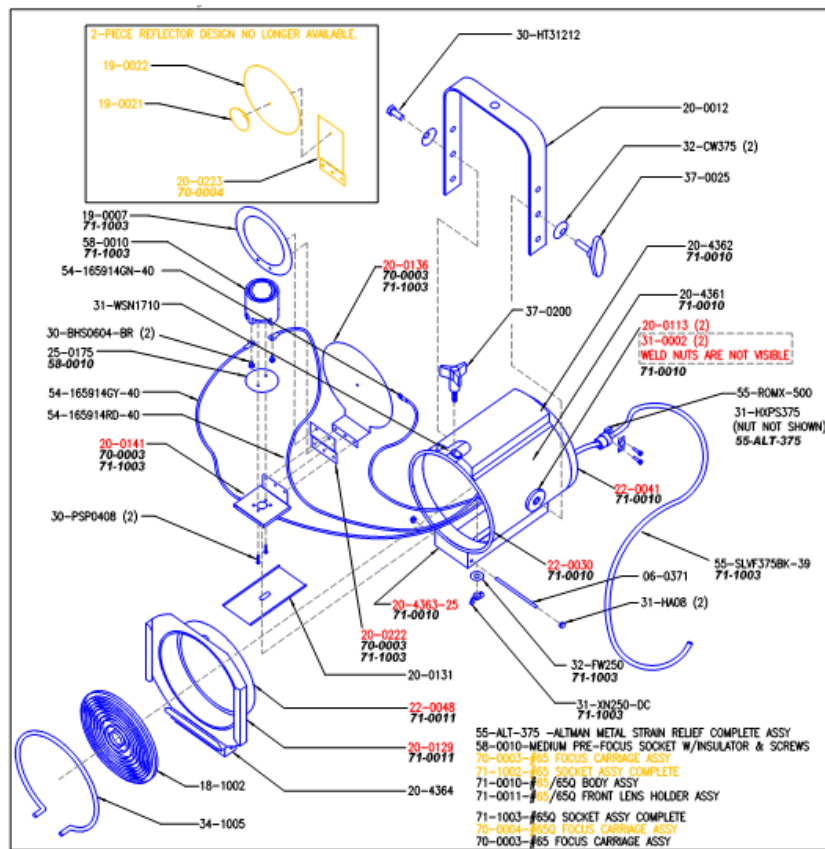
Figure 43: Breakdown Fresnel[4]

C-Clamp

The C-clamp is used for keeping the instrument up in the grid. It also has controls some of the movements of the instrument. On the bottom of the C-clamp there is a bolt that when loosed causes it swivel.

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[5] "65Q Service & Parts Manual Drawing." Altmanltg.com

Gels

Gels on the fresnel are very similar to the ellipsoidal but there is no latch. The frame that holds a gel is a square track closed on three sides. It is important to hang the light with the open side up so the gel does not fall out. Also the frame is larger on the fresnel so it requires more gel.

Barn doors

Barn doors are shuttering devices that are only used on fresnels. This is because fresnels do not have an internal shuttering device. Barn doors are mounted on the front of the instrument in the same spot as the gel frame; both can be mounted at the same time. Whenever a barn door is mounted on an instrument in the grid it must have its own safety because the fresnel does not have the latch that an ellipsoidal has. Barn doors are especially helpful when trying to keep light out of the audiences' eyes.

Figure 44: Fresnel with barn door (closed)

Figure 45: Fresnel with barn door (half open)

Figure 46: Fresnel with barn door (open)
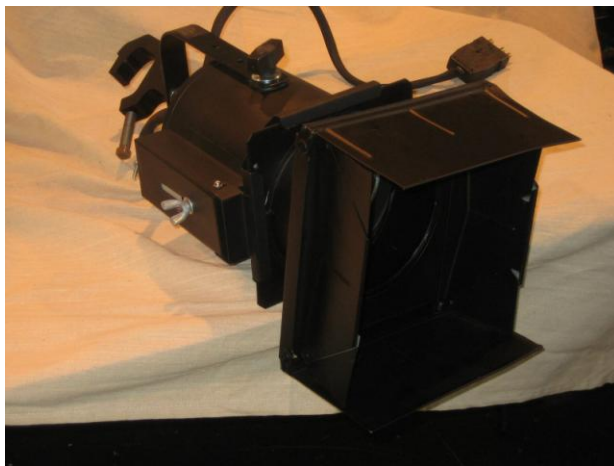
Figure 47: Fresnel with barn door

Change a Lamp

Changing a lamp in a fresnel is very different from the ellipsoidal but the white glove rule still applies.

- Make sure the instrument is not connected to a power source.

- On the top of the lens of the fresnel there is a knob; loosen it until the front lens come down.

- Reach in with your white gloves, twist the lamp base, and remove.

How to Hang a Light

One of the most basic but important things about lighting a show is hanging the lighting instruments. When it comes to hanging instruments the concept is the same for both types of instruments but with some minor differences.

The first thing you should do is make sure you are ready to hang the instrument by:

- Making sure you know where the instrument is going.

- Getting your a- frame ladder ready and in place. With an A- frame ladder you want to make sure all four feet are flat on the floor.

- Make sure you have a safety cable on the instrument ready to go.

- Also have a wrench with you.

- Make sure before you ascend the ladder that the c-clamp bolt is loosened as this will make it easier when you are in the grid.

Ellipsoidal

Hanging an ellipsoidal can be a difficult task due to the weight of it, 16.3 pounds c-clamp included, but if you are careful and know what you are doing all will go well. After you have made sure you are ready you then can hang the instrument by climbing the ladder. On the way up have the C-clamp of the instrument in one hand and your other hand on the ladder or if there is someone helping you have them pass the instrument up to you. Once you are up there with the instrument the first thing you do is hook the C-clamp to the grid pipe. Next you tighten the C-clamp bolt with your hands until you cannot any more and after that immediately secure the safety cable. Then you can tighten the bolt or adjust accordingly.

Fresnel

The fresnel is a much smaller and simpler instrument. The fresnel weighs 11.3 pounds and is approximately one third the size of an ellipsoidal. Hanging a fresnel is much like hanging an ellipsoidal in the essence it has a C-clamp and a yoke. The one big difference is that there is no set screw on the C-clamp to make the instrument swivel so you must loosen the bolt that holds the C-clamp and rotate the instrument that way.

Yoking a Light Up

Yoking up an instrument is another way to hang an instrument. This method starts the same way but after you put the safety cable on you loosen the yoke bolt and swing the instrument so that it is perpendicular to the yoke. Retighten the bolt and make sure that C-clamp is loose so that it can move. This next part requires some upper body strength. Swing the whole instrument and yoke up into the grid so that it is in the same position as it was before but over the grid. Then with one hand tighten the bolt on the C-clamp and with the other hand hold the instrument. Make sure before you swing up the instrument that the smaller bolt on the c-clamp is tight. Once it is secure, then adjust the instrument however you need it.

The Lighting Board

Introduction, and Non-standard Lighting controls

Introduction

The Little Theatre opened in 2005, equipped with its own lighting board. This section of the lighting handbook deals primarily with the use and simple maintenance of the lighting board within the Little Theatre. All board specific explanations and diagrams assume an ETC Express 125/250. As of this writing, (June, 2007) this was the current board in operation in the Little Theatre.

This lighting board allows for variable control of lighting instruments plugged into the plug boxes mounted in the lighting grid. These plug boxes are wired into the dimmer rack. The lighting board controls these dimmers via a 5-Pin XLR cable.

Modes and Settings

Submasters

Grandmaster

Cue fade A/B

Cue fader C/D
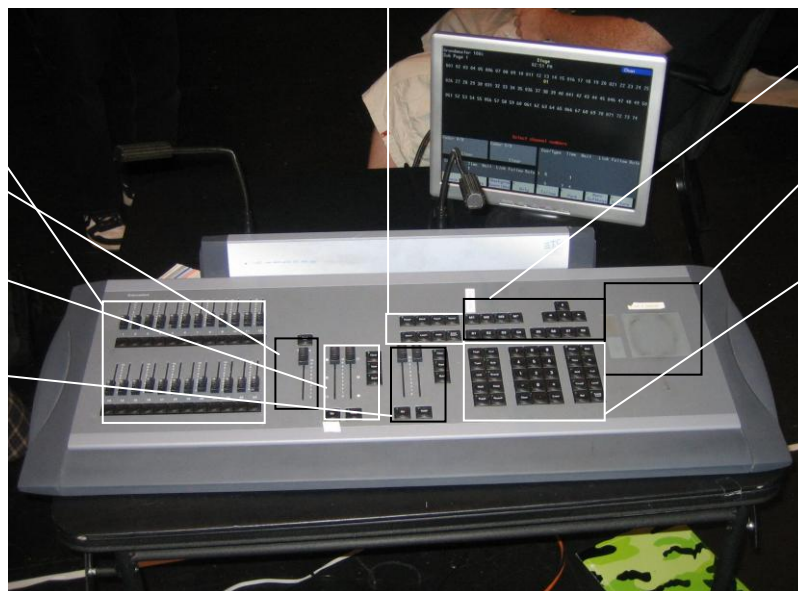
Macros &Softkeys

Trackpad

Control pad

Figure 48 – ETC Express 125

A single lighting instrument or a group of lighting instruments can be controlled three ways: with a submaster, with a cue, or setting channel levels manually. Each one of these

methods has a certain dominance, and one may supersede another, but this topic is not covered in depth here. See the manufacturer's manual for more information.

Included with this Handbook are two disks labeled "Base Show" and "Current Show." Both disks are provided for your use, but must be returned after your show strike. Both disks should initially have the exact same contents. During strike, the disk labeled "Current Show" should have its contents overwritten so that it is a copy of the "Base Show" disk.

Wall Panel and Dimmer Rack

There are three wall panels in the Little Theatre. Two control only the House lights, one controls the house lights and the Base Plot. The two single function wall panels are next to the doors on the north wall of the theatre. The multi use wall panel is located next to the door inside the control booth. When the House lights are on via the wall panels, then the house lights cannot be controlled from the board. Turning the instruments on from the wall panel is referred to as "taking the house lights off the board" or, in the reverse, "putting the house lights on the board."

Figure 49: Control panel near vestibule entrance

Figure 50: Control Panel in booth

The dimmer rack is the middleman between the Lighting board and the lighting instruments. The dimmer rack is what actually supplies power to the instruments as directed by the lighting board. The wooden structure above the rack must not be removed, as the rack needs that space for proper ventilation. Inside, the dimmer rack has thirty-seven dimmer cards. Each dimmer card is actually two dimmers which can be controlled independently. Each dimmer card has two breaker switches and two signal lights on the front. Before removing a dimmer card, verify that no power is flowing through it.

Figure 51: Dimmer rack, open

Figure 53: A dimmer card with the breakers engaged (Top, center). A dimmer card with the breakers unengaged (bottom)

Figure 52: Dimmer rack, shut

Figure 54: An active dimmer card (center)

Do this by checking the board, wall panel, and the signal light of the dimmer card itself. Once this is verified, flip the breaker switches from left to right, and smoothly remove the card from the rack. The dimmer card must be removed before servicing or changing the house lighting.

Before Programming

Before you begin to program your show, the disk labeled "Base Show" should be inside the board. When you wish to begin programming your show, remove this disk and replace it with the disk labeled "Current show." Press [M2] "Read show." Press [Enter] at the following prompt. Once the command has run you have a baseline to work with in creating your show. If this is not a blank show, follow the instructions under "During strike" to clear the disk.

During Strike

During strike you should return the lighting board to a non-active show state. You can accomplish this by clearing the disk labeled "Current show" and leaving the disk labeled "Base Show" in the disk drive.

To clear your show off the disk, remove the disk labeled "Current Show" and place the disk labeled "Base show" in the disk drive. Press [M2] to read in the show. Press enter when prompted. When the function completes, remove the disk from the drive. Insert "Current show" into the drive. Press [M1] to save the show to disk. Press [Enter] when prompted. Remove the disk from the drive and insert the disk labeled "Base Show." Place the disk labeled "Current show" in the back of the lighting handbook, and leave it in the booth.

Textual conventions

Channel levels are referred to in double digits, even when less than ten. 100 percent on a

channel is referred to as FL or full. When referring to a key on the lighting board it will be enclosed in

braces[ ] such as [Stage][5].

---

[5] *125 and 250 Lighting control system, Version 3.1* Electronic Theatre controls , June 2001, 2

Lighting Board Explained

Areas of the Board

Submasters

This board has 24 physical submasters (also called sliders) and 10 software pages of submasters

Figure 55: 24 Submasters each with a bump button

Control Pad

Encompassing some of the most used keys on the entire board, the control pad consists of a key pad, and Channel controls
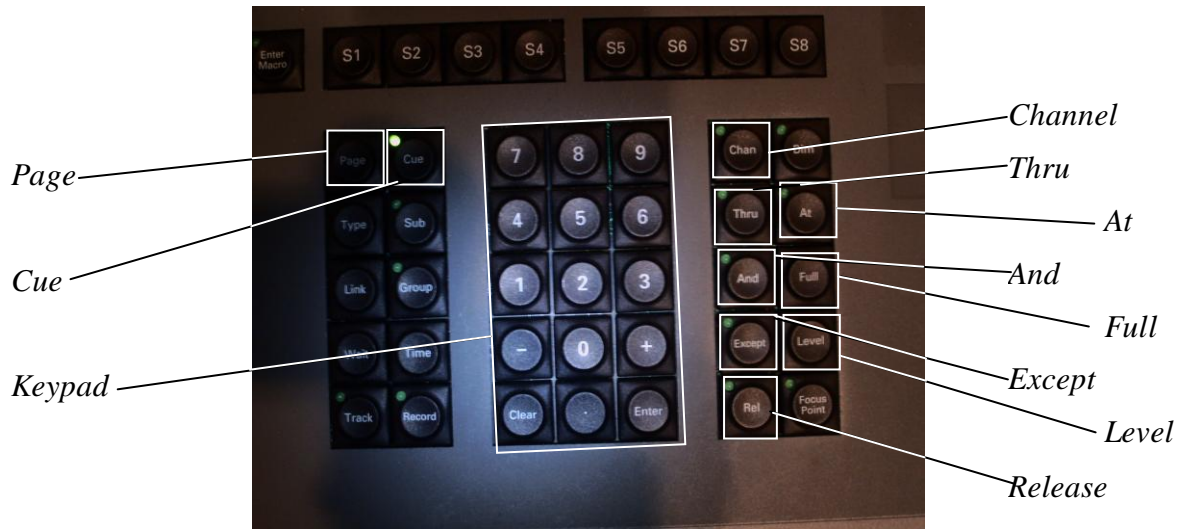
Figure 56: Keypad and commonly used buttons

Board Modes

[Stage] See and manipulate live lighting effects and looks.

[Blind] Manipulate cues and setting without affect the live stage.

[Patch] Set and change the patching of dimmers to channels.

[Setup] Change system settings and clear system memory.

Figure 57: Mode and help keys

Macro & Softkeys

Two macros are set by default. [M1] is "Save show", and [M2] is "Read show." The softkeys

will change depending on what board mode you are in.
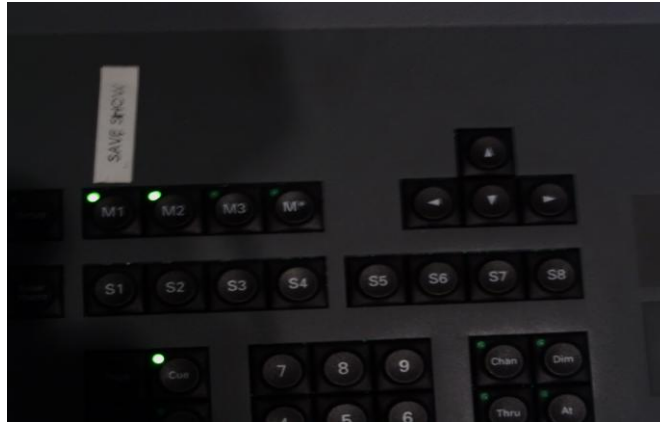
Figure 58: Macro and softkeys

Other controls

Trackpad

When a channel is captured, the trackpad allows for fine control of the channel levels.

Blackout

Tap [Blackout] once, everything goes black, tap [Blackout] a second time, everything goes back

to the way it was.

Grandmaster

Before the board is powered down the grandmaster should be brought to 00, and once the board

is powered up, the grandmaster can be returned to FL. The grandmaster controls all the channels and

supersedes all presets.

Setting Channel Levels and Other Show Functions

Using the keypad to set channel levels involves two steps: selecting the channels whose levels

you want to modify, then entering output levels[6].

Keystroke:

1. Press [Chan]

2. Select channels with a combination of [Thru] [And] and [Except] along with the keypad

3. Press [At]

4. Press either [Full] [Level] to automatically set the channel to FL or 75

Once you are done with this sequence, the [Chan] LED will stay lit, signifying that if you wish to set

more channel numbers you may skip the first step in this sequence. [Level] can be adjusted for your

show, but 75 is the current Little Theatre default. Press [Rel] to release captured channels in the

reverse order they were inputted. A captured channel will supersede cues and submasters, but not the

grandmaster, until released.

---

[6] Electronic Theatre controls, op. cit., p.56

What is a Submaster?

"A submaster is a group of channels recorded at proportional levels and controlled by a slider and a bump button[7]" when recording a submaster, what the channel is set to will become the highest value of the submaster. The bump button, located directly below the slider, will immediately bring all channels associated with that submaster to their full recorded level. Each submaster has an LED incorporated into the bump button. If that LED is lit, then the submaster has channels associated with it. If the LED is dark, no channels have been associated with the submaster. The style discussed thus far is referred to as a "Pile-on" submaster. Two other types of submasters exist, called "Inhibitive" and "Effect" submasters. Refer to the manufacturer's manual for more details.

How to: Program a submaster

In either "Stage" or "Blind" mode bring whichever channels you wish to be associated with the Submaster to whatever level you desire. Whatever is shown on the monitor will become part of the submaster you choose[8].

Keystroke:

1. Select either [Stage] or [Blind]

2. Set Channels to desired levels

3. Press [Record]

4. Press the bump button of what submaster you wish to program

---

[7] Electronic Theatre controls, op. cit., p.151
[8] Electronic Theatre controls, op. cit., p.157

How to: Changing submaster pages

Keystroke:

1. Press [Page]

2. Using the Keypad enter a number between 1 and 10

3. Press [Enter][9]

How to: Delete a submaster page

Keystroke:

1. Press [Setup]

2. Select "Clear Functions"

3. Press [Enter]

4. Select "Clear Submasters"

5. Press [Enter]

6. Prompt reads: To clear submasters, select page and press ENTER (0 = All pages)[10]

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[9] Electronic Theatre controls, op. cit., p.154
[10] Electronic Theatre controls, op. cit., p.170

Cues

What are a Cue and a Cue stack?

A cue consists of channel levels, cue attributes, and a cue type. A cue can be set up in either [Stage] or [Blind]. In this handbook we will cover crossfade cues. Other types of cues are discussed in Chapter 7 in the manufacturer's manual.

A cue stack is a numerical listing of cues from lowest number to highest number. A cue stack is controlled by using [Go], [Back], and [Clear]. When moving through a cue stack, the board will only consider cues that have been recorded. When you press [Go] the cue stack will load up the next highest cue into the fader.

A cue may also have a "Link" or "Follow" associated with it. If cue 2 is linked to cue 32, when cue 2 is loaded into the fader, cue 32 will be the next cue, instead of the next cue in numerical order. Link allows you to execute a non-sequential cue stack. If cue 4 is followed by cue 5, after hitting [Go] for cue 4, cue 5 will go immediately after a programmed time, without the operator hitting the [Go] button again.

How to: Record a cue

Recording a cue varies depending on if you are working in either Stage or Blind. Working in Stage allows you to work with the instruments live on the stage. Blind does not affect the current light levels, and you can modify levels without changing the look onstage. There are advantages and disadvantages to working in either Stage or Blind; you will decide which is best for your situation.

Recording a cue is very similar to recording a submaster, except instead of using the bump button, you will use the cue button, and one extra step in stage mode[11].

Keystroke (In Stage mode):

1. Select [Stage]

2. Set Channels to desired levels

3. Press [Record]

4. Press [Cue]

5. Enter desired cue number

6. Press [Enter]

Keystroke (In Blind mode):

1. Press [Blind]: You will be prompted for a cue number

2. Enter desired cue number

3. Press [Enter]

4. Set desired channel levels

5. Press [Record]

6. Press [Enter]

Blind mode varies in several ways from Stage mode. Stage is useful for creating a look, while

Blind mode is more useful for editing cues.

How to: Delete a cue

Keystrokes:

1. Press [Blind]

2. Press [S6], Delete Cue

3. Enter number of the cue to delete

4. Press [Enter]. You will be prompted to confirm or cancel

5. Press [Enter][12]

---

[11] Electronic Theatre controls, op. cit., p.84
[12] Electronic Theatre controls, op. cit., p.98

The diskette you have been given will have this sample cue stack preloaded onto it. This simple

show includes 12 cues and a single follow cue. It uses the Base Plot and can be considered the starting

point for assembling a cue stack.

Sample cue stack

Cue 1   Blackout
Cue 1.1   House at FL
Cue 1.2   House @ 15
Note: This cue has a "follow" set. It will automatically move to Cue 1.5 once Cue 1.2
has completed
Cue 1.5   House @ FL
Cue 2   Blackout
Cue 3   Glow
Cue 4   Blackout
Cue 5   Stage Lighting
Cue 6   Blackout
Cue 7   Curtain Call
Cue 8   Blackout
Cue 9   House @ FL

How to: change upfade/downfade

Keystroke:

1. Press [Time].

2. Enter desired upfade time.

3. Press [Time] a second time.

4. Enter desired downfade time.[13]

How to: add a link to a cue

Keystroke:

1. Press [Stage] or [Blind]

2. Select the cue number you wish to link from using [Cue] and the keypad

3. Press [Link]

4. Enter the number of the cue you wish to link to using the keypad

5. Press [Enter][14]

How to: Add a follow to a cue

Keystroke:

1. Press [Stage]

2. Select the cue number you wish to set a follow on using [Cue] and the keypad

3. Press [S5], Follow

4. Enter the follow time desired using the keypad

[13] Electronic Theatre controls, op. cit., p.85
[14] Electronic Theatre controls, op. cit., p.88

5.   Press [Enter]¹⁵

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¹⁵ Electronic Theatre controls, op. cit., p.89

Etiquette & Safety

How to: Commands when using a lighting board in a group.

When programming cues or submasters for a show, often one person will operate the board, and one or more people will walk around the theatre and ask for certain channels to be brought up or down. The commands presented here should be used to avoid confusion.

"Please Bring (up/down) (Channel X) {at (Level YY)}"

When using this command, some portions may be omitted. "Please Bring 47 down" means to bring channel 47 to 00, while "Please Bring 47 up" means to set channel 47 to FL. If all sections are used greater precision can be achieved. Sometimes bringing a light "up" means to set it at [Level]. Before a session of cue programming a common set of terms should be reached.

Sample lighting commands

"House going dark!"

This command should be issued in a loud clear voice, to alert anyone in the theatre, that the house will be going to blackout or near blackout

"Thank you dark!"

This command should be used by everyone who hears "house going dark." This is an extra safety measure so that people are not caught off guard in darkness.

Typically during a show three people will be in the control booth. The stage manager, the lighting board operator, and the sound board operator. Each one of the board operators responds to the directions of the stage manager. A stage manager "calls" a show by calling a cue as it appears in the script. A board operator "runs" the board by responding to the cues given by

the stage manager. Often the cue stack will be ordered directly in line with the show, and running the board for the show is as simple as pressing [Go] when directed. Some shows, such as a festival show, may require a cue loaded using the [Cue] and keypad. Often stage managers will have their own commands for calling the show, but sample commands are presented here. Personal preference aside, there are certain words that cannot be said while calling a show. No one in the booth or on headset is allowed to use the word "go" except the stage manager, even then the stage manager is only allowed to use it when calling a cue. The word "go" is heavily restricted because it is the actual signal for a board operator to execute a cue. If the word is accidentally said , then a cue can be misexecuted, and a show can be interrupted. Other words that sound like "go" must also be avoided, especially "no." Instead of using "no" use words like "incorrect" or "wrong."

Sample lighting commands

"Ready L2"

This signals the lighting board operator that cue 2 is approaching. S2 would refer to sound.

"Thank you L2"

This lets the stage manger know that his commands have been heard and understood. If this is not the case, the board operator should respond with the next command.

"Sorry say again?"

If there is ever a breakdown in communication, this command should be used to repeat the last phrase given.

"L2 Go"

The lighting board operator should press [Go] once this command is given, and respond with "Thank you L2"

"A gel is melting! Kill (channel number / the board)"

Gels are made from a polymer, and with use spots on the gel sheet will begin to melt and a hole will burn through. It is a good idea to check the gels for these holes before shows because melting gel will distort the color a gel produces.

Fog and Haze

Background Information

  Fog and haze effects are an excellent enhancing tool for lighting designs, but they mimic smoke particles and can trip a fire alarm that uses particle detection. When an effect with particles is used in the Little Theatre, it is necessary to switch the alarms into bypass so the alarms do not sound during a performance. The bypass system in place only silences the alarms, which can create a problem when a stage manager switches back to normal mode. If an alarm has been tripped by fog during bypass, the alarms need to be reset on the main panel to avoid the alarms sounding, evacuation of Riley Hall, and the response of the Worcester Fire Department. We have worked with WPI Police to update the protocol to add a step involving the response of a WPI police officer to reset the alarms before the system is switched back to normal so the alarms do not sound. This would only be necessary in the event that a production member finds a tripped alarm.

  For fog use, as long as the effect is aimed away from a detector or ventilation intake duct, the fog should dissipate quickly enough that an alarm will not trip. Lighting designers, master electricians, technical directors, and directors, and any other production staff should be aware of this when discussing a desired effect. Just keeping this in mind should not restrict any artistic vision; it will just eliminate the risk of tripping an alarm. Someone on the crew should be assigned to make sure the alarms haven't been tripped.

  When using haze, there is a little more to consider. It has been decided that during all performances one ventilation system will be running constantly on low. This is to keep the audience comfortable and to assist them in blocking out the noise made by removing the contrast

of the system turning on or off. The concern comes because the ventilation system extends into the vestibule outside the stage. The bypassed alarms are only inside the stage area and do not include the vestibule ones. First, because haze particles are taken into the vents, the alarms testing the air inside will be silently tripped, and will require the alarms to be reset after the haze has completely cleared out. Second, hazy air will be deposited into the vestibule areas, and if concentrated enough in that area, it could trip one of those outside alarms. Since they are not silenced, all alarms would sound and all of Riley Hall would need to evacuate, including the performance.

The alarms in the green room also are not included in the bypass system, and will sound if tripped. There is an alarm in the green room right above the doorway, easily tripped if haze is in the air. If actors are moving up and down, a theatre full of haze will carry down the stairway. Therefore, it is critical to have the door to the green room closed the entire time haze is in use, with the exception of quick entrances and exits. A fan at the base of the stairs blowing up is also helpful to keep haze away from the doorway. With the ventilation system going, the fan will not create much excess noise and will be blocked out if left on constantly.

A way of reducing the chance of an alarm being tripped is to consider "quick-dissipating" fluids compared to regular fluids. These disperse through the air much more quickly than regular fluid and do not last long enough to reach an alarm. Depending on the desired effect, quick-dissipating fluids can be a reasonable option in many cases. Testing different fluids, fog machine locations, filters and temperatures can create the perfect look and eliminate any hassle from the bypass system. This handbook advises that testing in show conditions will allow you to fix any issues with the fog set-up before an audience is watching.

If an alarm has been tripped, it will be indicated by a solid red light on the alarm, a light that would otherwise be blinking to show it is online. The alarms are located in the ceiling and on the air vents, and there are boxes on the columns facing the smaller seating bank with lights that will turn red if an alarm has been tripped.

When using fog effects, it is necessary to wait until any visible remains of the fog have cleared away before switching back to normal mode. To clear out remaining fog or haze, the side door on the stairs to the green room can be used with a fan to create circulation. Since the alarms in the green room and vestibule are not silenced, the side door is the best choice for air flow. Once cleared completely, a production member, most likely the stage manager since he is responsible for switching the bypass system, should do a walk through checking if any alarms have been tripped. Once the fog is cleared, the stage manager can call campus police to switch back to normal over the phone (as outlined in the protocol posted in the booth or on page 96 in the handbook). If an alarm has been tripped, at this time the stage manager should request police assistance to reset the Little Theatre alarm zone so the alarms will not sound falsely. In the event that a real emergency is causing the alarms to trip, they will be set off again after being reset, and Worcester Fire will then respond to investigate. At least one person must stay in the theatre until the alarms are back in normal mode. This way if the officers are tied up with other calls, someone is waiting there assuring no real emergency goes undetected.

It is important to remember that even though the alarms are silenced, audience members are protected by a heat activated sprinkler system. If a fire were to spark in the theatre while in bypass mode, the heat caused by the fire would trigger the sprinkler system to extinguish the fire. If the sprinkler system trips, the audience should evacuate. As provided by the Fire Protection

Engineering department here at WPI, there have been no reported cases of anyone dying with a system like the Little Theatre's. Therefore even with the silenced alarms, the safety of the audience, actors, and production staff is still a priority. By resetting the alarms when the cause for the tripped alarm is known, an entire dorm building does not need to be vacated and Worcester Fire does not need to respond to a false alarm.

Using the Fog Machine

The Little Theatre owns a LeMaitre G300 fog machine. It is a very good, high-end dual fog and haze machine. As stated on the Le Maitre website, "The G300 is the most technologically advanced dual purpose machine available."[16] It features both 5-pin XLR and Analog controls, a very high output rate, and comes with a mounting bracket so it can easily be hung on the grid. It's truly an amazing machine, and should be able to fit the needs of any show.

Breakdown of Parts

Output Nozzle

This is where the fog comes out. There are two different nozzles that can be attached to direct the fog: the regular nozzle and the silenced nozzle. Both of these attach with screws on the top and front of the fog machine box.

The regular nozzle is basically a metal tube that attaches onto the end of the machine to direct the output away from the box. It can easily be attached to 4" dryer vent hosing that can move fog from the machine through a chiller, or wherever else it needs to go in the theatre.

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[16]Le Maitre Ltd. "G300" Lemaitreltd.com/productDescription.asp?idxProduct=1&idxCategory=8 (accessed June 17, 2007).

Figure 59: Regular Fog Nozzle

The silenced nozzle is slightly more complicated than the regular nozzle. When the fog machine lets out fog, it hisses. In a large proscenium theatre, like Alden Hall, this noise is masked backstage by the curtains and proscenium arch, however in a small intimate theatre, the hissing is frequently undesirable. The silencing nozzle dampens the noise with foam so that the machine can be placed in more convenient locations without interrupting the performance.

Figure 60: Fog Silencer Nozzle

Box

The bulk of the fog machine is a black box, both figuratively and literally. It takes in fog fluid, electricity, and commands; and puts out fog. Inside of the machine, there is a heat

exchanger that converts the fog fluid into fog. In order to work properly, the heat exchanger needs to be at a certain temperature, so before it can be used, the machine needs to warm-up for around fifteen minutes.

Figure 61: The box of the fog machine

Controller

The G300 comes with two different types of controllers, one analog and the other digital. Both of these connect to the box via a 7-pin XLR connection on the top of the box. They can either plug directly into that connector or be routed through the theatre's own 7-pin XLR cable.

The analog controller is a basic fog controller. It controls the flow rate, duration of output, interval between outputs, and whether or not smoke comes out of the switch. For use as a special effect, both the interval and duration knobs should be turned completely counterclockwise so that the fog doesn't come out after it's intended to stop.

The digital controller integrates all of the functions of the analog controller with DMX controllability. When plugged into a DMX chain and addressed properly, any simple lighting board can control the fogger in much the same way it can control a lighting instrument. As a

simple means of testing that the machine works, everything can still be run manually from the digital controller as long as the smoke and flow switches are switched to manual mode.

Figure 62: Digital Controller (top) and Analog Controller (bottom)

Fog Fluid

One of the most useful features of the G300 is that it can put out both fog and haze with only a simple settings change. For more information on the difference between these, look in the design theory section of this handbook. Regardless of which you choose to use, **NEVER PUT OIL-BASED FOG FLUID THROUGH THE FOG MACHINE, IT WILL WRECK THE HEAT EXCHANGER AND THE MACHINE WILL BECOME USELESS**.

During strike for a show, the machine has to be cleaned to ensure that the heat exchanger and other internal piping do not get clogged up. To do this, attach the EZ-Kleen fluid to the machine as though it's regular fog fluid and let it run through the machine for 5 to 10 minutes. The fogger should spew either fog or haze as the previous solution filters through the machine, then the output should eventually become clear. This procedure should be performed after every show that it's used so the fog machine gets stored in a clean condition.

Types of Effects

Fog fluid is a glycol/water mixture, and when heated will make thick clouds of opaque fog. It will disperse through the air with a few minutes, but where the fog is released, there is very little visibility. The heated fog will rise in the air and disperse evenly, but cooled fog will stay close to the ground. Fog effects are good for suggesting smoke, magical appearances and exits, or many other effects[17]. Fog comes in normal or quick-dissipating. Normal will linger for up to a few minutes, depending on the volume and duration the fog is produced. Quick-dissipating fog fluid disperses 5-10 seconds after exiting the machine[18]. These times refer to how long the fog is concentrated enough to be visible.

Haze is also glycol/water based fluids but differs in dispersion. Instead of thick billows, haze is misted out of the machine, and fills the air evenly. This remains in the air much longer, but is less visible. Because beams of light bounce off the thin particles, beams of light are clearly defined and the smoggy look is useful for a multitude of effects. For Little Theatre use, haze has many more precautions that need to be worked out, so test runs even before tech week are highly suggested.

Another option that does not involve using the Le Maitre G300 is dry ice. Dry ice, or solid carbon dioxide, is placed into boiling hot water, where it sublimates. Sublimation is the direct phase change from solid to gas (skipping the usual middle step of liquid). Fans can then direct the fog where needed[19]. Because of its cold temperature, it lies close to the floor creating a rolling carpet effect, good for heavenly scenes, or swamps. Dry ice tends to be cheaper than fog

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[17] Theatre Effects, "Foggy Notions - Part 2: The Unique." www.Theatrefx.com/funfacts71.html (accessed June 17, 2007).
[18] Pea Soup, "High Output Smoke Machine/Hazer in One" www.Smokemachines.net (accessed June 17, 2007).
[19] Special Effects, "Dry Ice Fog." www.dryiceinfo.com/fog.htm (accessed June 17, 2007).

fluid, but there is a very advanced fog and haze machine available that considering as a first option is suggested.

Though a few ideas for fog and haze use were given, designers will come up with unique ideas for the show they are working on. Don't restrict yourself to the examples given, as we are fortunate to have a very versatile machine.

Hanging Bracket

The G300 also comes with a mounting bracket so it can be hung in the grid with a C-Clamp.

Using the Fog Machine

How to Connect the Fog Machine to a DMX Chain:

1. Make sure that the digital controller (not the analog controller) is attached to the machine. The Digital controller has two 5-pin XLR (DMX) connectors on it, one male, the other female

2. Plug in the DMX cable to the controller and then to the board (or whatever else is next in the DMX chain)

3. Switch the flow and smoke switches on the controller to DMX.

4. Plug in fog machine power and turn the machine on.

5. Address the fog machine using the dipswitches on the digital controller. Two sequential channels must be dedicated to the fog machine (flow and smoke), whatever you set the dipswitches to will designate the first of the two.

6. Wait for the machine to warm itself up.

7. The channel you addressed the fog machine to will control the flow rate (between zero and 100 percent) and the next channel will control output (0 is off and any other value is on)

How to Control the Fog Machine with the Analog Controller:

1. Connect the analog controller either directly (following the instructions printed on the machine) or through the 7-pin XLR cable.

2. Plug in and power on the Fog Machine

3. Wait for the fog machine to warm up

4. Set the Interval, Duration, and Flow Rate knobs to the desired levels

How to Change the Nozzle:

1. Remove the screw on the bottom of the machine that holds the nozzle in place.

2. Slide the nozzle down and it should come off. If not, loosen (do not remove) the two screws on the front of the fog machine.

3. Slide the replacement nozzle up so that the screws on the front fit into the spaces on the nozzle.

4. Replace the screw on the bottom of the fog machine.

How to Mount the Fog Machine in its Rigging Bracket

1. Remove the two smaller holders (not the yoke) from the bracket itself.

2. Remove the bottom screw from the nozzle and securely tape it to the back of the machine, it will not be used while the fog machine is in the bracket.

3. Place the fogger in the bracket, making sure that the feet on the machine line up with the holes in the bracket (this lines up the center of mass with the yoke mounting).

4. Re-attach the two smaller holders to the bracket, making sure that they reach over the fog machine and are inside of the handles on top of the machine.

Attaching Dryer Vent Hosing

1. Attach the regular nozzle.

2. Slide one end of the hosing around the regular nozzle and secure it there with a cable tie.

Design Theory

Directions of Lights

Front Light
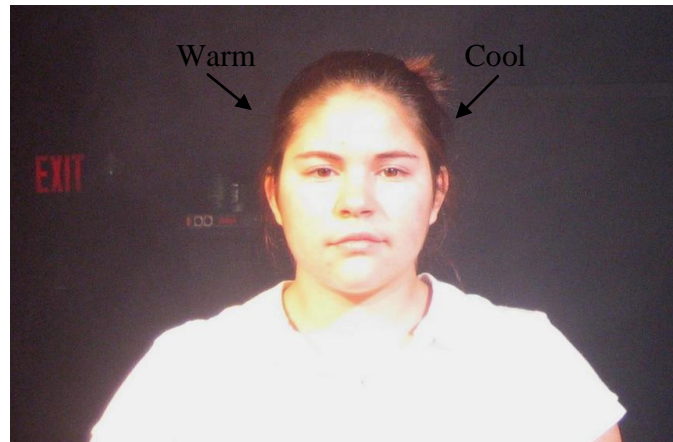
Figure 63: a face lit with warm and cool light

Figure 64: front light beams visible with haze

Front light involves warms and cools coming from different angles to give the faces

dimension[20]. As seen in this picture above, there is a warm light on the left (typically R02) and

cool light on the right (typically R60). The subtle contrast of color on the face allows the eye to

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[20] Swift, op. cit., p.33.

see the 3D features instead of washing all those out with monochrome light. Front light is recommended to hang down at 45 degrees from the grid, but while this is an industry standard, the Little Theatre has such a short throw distance that smaller angles are more appropriate. Focusing will determine the best angle for your design.

Down Light
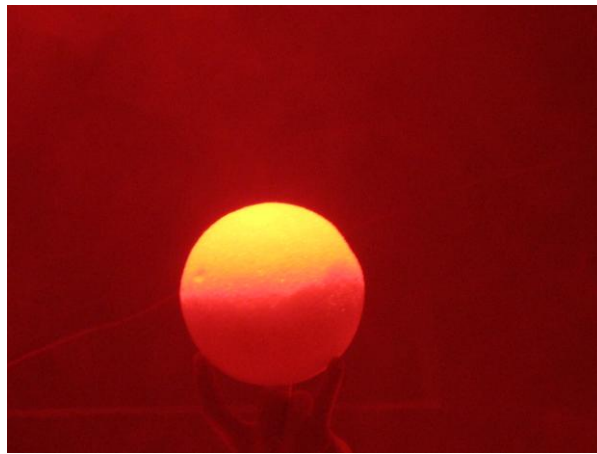
Figure 65: down light shown on a sphere
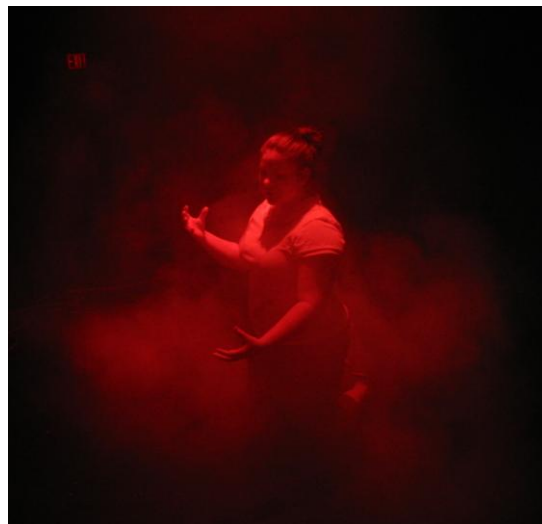
Figure 66: An example of the dramatic effect produced by down lighting

Down light is hung directly above the subject and is focused straight down[21]. It will give the look shown above, where the top surfaces, such as shoulders and noses, are lit, but makes faces difficult to see. Down light is good for stage washes that use colors because it allows designers to play with moods created by color, and adds more dimension to actors by highlighting more features than front light alone.

Back Light

Figure 67: Back light on a sphere

Figure 68: Back light with haze

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[21] Swift, op. cit., p.34.

Back light is focused behind the subject and creates a halo effect. As shown here with the blue light, the outline of the actor is shown from the back light. This is another good addition to a lighting design because if there is a detailed set, back light will separate the actor from it. It also brings a third dimension to the stage. Front lighting tends to make the stage look 2-dimensional and flat, but back lighting sculpts and forms actors and objects, separating them from the background[22].

The Whole Package
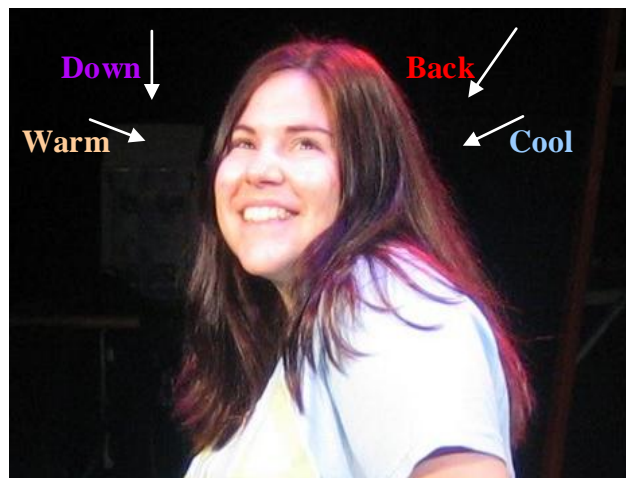
Figure 69: All lights together

When all these directions are combined together, it creates a well-lit and defined actor. The front lights give dimension to the actors face to allow for expressions when acting, but without drastically changing the natural skin tones. The down and back light colors are exaggerated, but show the enhancing features they provide. See how happy our model is with all this light!

Photometrics

Each and every instrument emits light differently. Some lights are made to focus light at a very specific point, and others shine evenly across the whole stage. So, how does one know which kind of light is most appropriate for their purpose? Photometrics is a way of describing the output of an instrument. Whenever a manufacturer makes a certain kind of instrument, somewhere a photometrics sheet for the fixture is posted to give a buyer an idea of exactly what the instrument can do.

Reading a Photometrics Sheet

Photometrics sheets offer a lot of information if you know how to read them. The most important measurements on a photometrics sheet are the field angle, the beam angle, and the output level.

The field angle describes the distance (in degrees) to where the beam of light is 10% of the intensity of the light at the center of the beam. This, combined with a little trigonometry, tells how wide the beam of light will be at a given distance. The field angle is the number used when referring to the fixture (for example, a 50 degree ellipsoidal has a field angle of 50 degrees).

The beam angle is very similar to the field angle, it describes where the light output falls to 50% of the center output. This is important when creating an even transition between fixtures. Ideally, for a stage wash, the beam angle could be equivalent to the field angle and light output would be even across the beam, but in the real world, a beam angle that's 2/3 of the field angle is about the best you can ask for.

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[22] Swift, op. cit., p.34.

Output level refers to how bright the beams of light are. This, of course, depends on what kind of lamp is in the fixture, so a good photometrics sheet will have measurements for several different lamps. Output level also varies quadratically with distance; mathematically, this is called the inverse square law. It is described by $1/r^2$ where r is the distance from the source of light. The inverse square law describes a body in space radiating light in all directions (the Sun, for instance), but the fixtures we're using emit focused light, so the inverse square law can't be applied directly to the output of the lamp, it has to be based on how the fixture focuses the light. For example, given the same lamp and throw distance, a 36 degree ellipsoidal will seem brighter than a 50 degree.

To account for this, manufacturers first measure the candlepower output of a fixture using a specific, commonly used lamp to give a base against which all other lamps can be calibrated. Each different lamp's output is then adjusted for with another coefficient known as the correction factor or the multiplying factor. In short, each type of fixture has a given candlepower, and different lamps are accounted for with the correction of multiplying factor.

To sum all of that up, a light's output level is given by the equation:

$$Level = \frac{(Candlepower)(Multiplication\ Factor)}{(Distance^2)}$$

Where the candlepower and multiplication factor are given by the photometrics sheet and the distance is between the fixture and whatever it's illuminating.

So what does Candlepower mean? To give a frame of reference, here is a table that shows some common light sources and their candlepower output.

Footcandles	Example
0.09	Moonlight
0.02	Full Moon on a clear night
0.93	Candle at a distance of 30 cm
4.65	Family living room
7.43	Hallway/Toilet
37.16	A brightly lit office
37.16	Sunrise or sunset on a clear day
92.9	Typical TV studio lighting
2972.87	Sunlight on an average day (min.)
9290.23	Sunlight on an average day (max.)

Remember that footcandles doesn't measure the brightness of the light source, they tell how much the surroundings are illuminated. Also, it's important to note that luminance is relative. Keep an audience in the dark for long enough and a poorly lit office will seem bright as day.

Between these three measurements, a lighting designer can get a pretty good idea of what a light will do onstage and figure out how to use the fixtures effectively.

Applications of Photometrics

There's all this information about the beam that a light emits, but how can lighting designers use it? The most obvious use is in figuring out how many lights will be needed to create an even wash across the stage. The height of the grid is known, as is the horizontal distance between the location being lit and the grid pipes, so the throw length can be easily calculated using the Pythagorean Theorem. Take the beam angle with a little trigonometry, and the diameter of the beam at head level gets calculated. From this comes the number of these beams it will take to cover the stage with light. To simplify this whole set of calculations, this IQP has created a spreadsheet that, given a beam angle, field angle, illuminance, and correction factor, will calculate beam and field diameters at both head and ground level.

Color Mixing

      Light color mixing is sometimes confusing since it is different than kindergarten finger painting may have taught you. The color wheels are different and some properties of light may seem counterintuitive at first, but can be learned.

Additive and Subtractive Color Mixing

      The primary colors associated with additive color mixing are red, green and blue, or RGB. When two of these primaries are mixed together, they make yellow, magenta or cyan, as shown on the color wheel. When all three are combined at equal intensity, white light is created. Just remember that mixed light colors go towards white, where mixed pigments go towards black, as shown in the subtractive color mixing. It's called subtractive because black is the absence of light. Subtractive color mixing pertains to theatre lighting with the gels that filter the light[23].
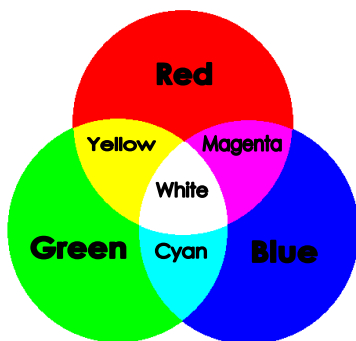
Figure 70: Additive Color
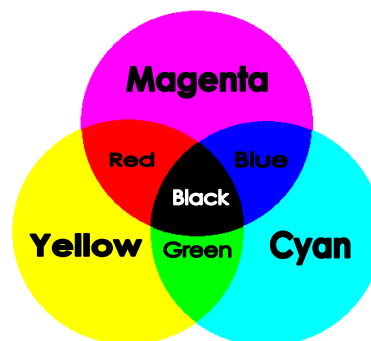
Figure 71: Subtractive Color

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[23] Steve Richardson. WPI Technical Theatre Handbook: Light Mixing, "Color." Prefect's Pages, http://www.gweep.net/~prefect/pubs/iqp/node1.html (accessed June 20, 2007)

Color Temperature

The temperature of color refers to warms and cools. Warm colors are purples, magentas, reds, oranges, ambers and yellows. Cool colors are violets, blues, cyans, and greens[24]. As shown in the lighting direction section, for lighting faces, warms and cools should be used together to create dimension.

Choosing Colors

Choosing the gels for a show is very much up to the designer. Different colors are said to convey certain feelings, for example red is known to portray anger. Choosing several wash colors that mix well allows the designer to create more colors than he has to hang. Many different effects can be generated with colors, and seeing experienced designers use these in specific examples is very beneficial.

And though pure white light will wash out actors, it is important that they are still well lit, and not just washed with colors. Ambers and light blues are commonly used for lighting actors because when used properly, they will emphasize dimension of faces with out greatly altering the natural tones of the actor.

Gels are used to filter the pure light produced from the lamps. Choosing the right gel involves looking through a sample gel book, and seeing what colors are available and if your choices mix well[25]. This takes time and patience, and to truly see how a gel will look with a stage light, hold the gel up to a bright, natural light source (the sun or a stage light). There are some in the gel boxes, or you can request one at:

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[24] James T. Saw. 2D Design Notes, "Color." http://jimsaw.com/design/color.html (accessed June 13, 2007)
[25] Max Keller, *Light Fantastic*. (New York, NY: Prestel Verlag, 1999), 123.

http://rosco.com/us/filters/swatchBookRequest.asp?type=roscolux

Figure 72: A Rosco swatch book

No Right Answer

This handbook can give you the tools to create a lighting design and can outline protocol that you need to keep in mind while working in the Little Theatre. However, we cannot walk you step-by-step through creating a lighting design. To attempt to do so would imply that there was a "right way" or standard way to create a design. There isn't. A large part of lighting design comes from the lighting designer. Anyone wanting to create a lighting design for a show should work on at least two productions before attempting to be a lighting designer. We offer this handbook to you as a way to learn the basics of lighting the Little Theatre, but the final step in creating a lighting design is to create one on your own.

Design Considerations

Now that everything's been introduced, there are a few peculiarities about the Little Theatre that should be noted going into the design process. First come the I-beams. No matter how they are used during the performance, they will block light and probably get in the way of any designer who doesn't plan for them. Second are the ventilation ducts. When lit properly, they can give the whole space a more industrial, surreal feel, but they usually just get in the way of up-hanging instruments. When trying to hide instruments from the audience by hanging them up in the grid, remember that not all grid spaces have the same amount of headroom.

Design Implementation

Creating a Light Plot

When a Master Electrician hangs a show, he/she needs to know what exactly which instruments need to be hung where. The Light Plot tells him/her everything that the Lighting Designer wants to see when it comes time to focus. A light plot is not just a sheet that tells where in the grid to put the instruments. It is a document with several different pages that all give different information about each fixture in the air or on the ground. A light plot also tells how the board should be patched, what cues need to look like. How many different sheets are needed to fully describe what instruments are where really depends on the show. Some shows are, amazingly enough, well done with fewer than ten instruments. For that kind of show, a complete lighting plot could easily fit onto a single sheet of paper, but designers frequently use more than ten instruments and thus more sheets are needed to describe how each instrument should be.

When creating a plot, the most important idea to carry along is that somehow, every attribute of every fixture, color, direction, type of light, etc., must somehow be communicated on this plot. Cue lists and plug charts are just as important to the plot because they give the Master Electrician an idea of how the show will work out.

Paper or Digital?

For a long time, all lighting plots were written out by hand on paper. This is a long process, but also very effective because the Lighting Designer has very direct control over exactly what got written down on for the Master Electrician to see. However, with the advent of computer aided design, a new tool that promised accuracy and flexibility in light plots began to

be developed. Currently, there are several different programs out there designed to assist with theatrical lighting. Some of them are as simple as photometrics calculators, and some are full-fledged design platforms that can render and run shows in three dimensions. WYSIWYG by Cast Lighting and Vectorworks Spotlight Edition are two of the more powerful programs that have been developed.

Designers now have a choice to either use paper or not when creating a plot. Paper plotting will most likely be easier for a first-time designer to use in order to get a feel for what a light plot should be. CAD programs have historically been much harder for anyone to get accustomed to because there is such a steep learning curve involved. However, once past that learning curve, the process becomes a quick drag and drop session.

One of the hurdles that is no longer a problem is having a CAD model of the Theatre. This IQP has created such a plot. It is accurate to within 3 inches at every point in the Theatre, including the ventilation and sprinkler system.

Plots and Charts

Plug Chart

Plug charts are useful during the entire light design process, from hanging to programming, because it's a quick reference for specific channels, instruments in areas, warm fronts, cool fronts, and gels needed.

	Channel	Instrument	Area	Position	Color	Gel
What	The channel the instrument is plugged into	Ellipsoidal (50° or 36°), Fresnel, par 16, Fog Machine, etc.	Referring to your area plot, where the light should be focused. Can also specify here for a special	The direction of the light: front, wash, back, down, overhung	the general color, warm, cool, blue, red, etc.	The brand and number of the gel used: Lee 202 or Rosco 27
Why	So when programming, you'll know what channel to program	A reference of what instrument you're using	So you know what area you are lighting	For hanging the light. What position the light is in, and you can work on just warm or cool fronts, etc	So you know what color the light is	To know what gel should be added to the light
ex.	*45*	*50° ellipsoidal*	*B*	*overhung, front*	*warm*	*R33*

Cue Sheets

Cue Sheets are an outline of what cues are used in a show.

	Cue Number	Description	Prompt
what	The number the cue is programmed in on the board, so it may contain a decimal.	A brief description of what the cue is, such as blue-out, night scene, house lights, etc. This is for programming and reference to make sure the cues are what they should be.	This is the line or action when the lighting cue should be. Include page numbers.
ex.	*3.1*	*Moonlight special*	*"To be or not to be" p.50*

Area Plots

Area plots are the break up of the stage into general divisions. After seeing the set design and the staging actors are using, the stage can be separated to where certain scenes can be played in isolated portions of the stage. When focusing, these areas should overlap to prevent dark spots and gaps when an actor is crossing the stage. This general division also serves as a reminder to repeat conventions such as front and down lighting evenly throughout the stage. Taking a copy of the scenic design and lightly sketching out the areas is beneficial to have. The labeled areas then connect back to the plug charts.

Cabling

After all of the instruments are hung for a show, they all have to be plugged in. This sounds simple enough, but it can easily get messy. In some venues, cabling a show neatly is really not very important because the instruments are hidden in the ceiling, so the audience will never see exactly how ugly the cables are up there. One of the coolest things about the Little Theatre, and small, intimate theatres in general, is that the audience can see everything. Nothing

is hidden from view, so every aspect of the lighting, from how and where the instruments are hung to how neatly the cables are placed, has to be planned and made to look good. Yes, it can be a pain, but in the end, it allows for more freedom and control over the whole theatrical experience.

In order minimize the number of cables being put up in the air, the locations of all instruments need to be planned before plotting where to plug each one in. The plug box locations should also be noted on the plot. Once all the instruments are on the plot, it's just a matter of mapping each instrument to a plug box. Try to leave a plug open on each box! You never know when you'll need that extra plug because the lighting designer needs just one more special right below that box.

Some Things to Think about When Cabling:

- Each grid space is a 4'x4' square, so a 5' cable is just a bit longer than one space and a 10' cable is 2.5 grid spaces long

- The instruments need enough slack in the line to be focusable.

- If the connector reaches to the c-clamp, then there will be more than enough room to focus the fixture

- Unless you want the grid to look like a giant spider is nesting in it, hide the cables by running them along the grid pipes and tying them up.

- Zip-ties are good because they can be easily cut with the theatre's diagonal cutters.

- Extra length in a cable can be coiled and hidden easily above a junction of two grid pipes

- Consolidate the mess. Several coils on top of each other look less messy than several coils right next to each other.

- If it's not pretty, it's not right!

Little Theatre Considerations and Protocols

The Base Plot

The Base Plot is the default lighting design for the Little Theatre. This design will be hung during every strike and will stay in the grid until the lighting design for the next show is hung.

The Base Plot Will:

1. Provide theatrical instruments for non-theatrical activities.

2. Give a framework for Lighting Designers to reference.

While Lighting Designers don't have to incorporate the Base Plot into their lighting designs, this IQP highly recommends it. Since the Base Plot minimizes the number of instruments used to light the Little Theatre, it is a good starting point for a design. Also, incorporating as many of these instruments as possible will reduce the need to re-hang them at strike.

Anyone creating a lighting design for a show can build off of this design; however these instruments are not enough. A Lighting Designer will need to add more instruments to fully illuminate the actors and the set. This Plot economizes instruments by minimizing how many instruments light the theatre, saving both time and energy during strike. The Base Plot assumes that the audience will only be sitting in the two permanent seating banks, and that the main playing area will be inside the four pillars.

There are Three Rules When Using the Base Plot:

1. The Base Plot shall be re-hung, re-gelled, and re-focused according to the charts during every strike.

2. The Base Plot is NOT house lighting. It shall be used only for specific activities where theatrical lighting is necessary.

3. If a light or gel burns out, notify a member of the Little Theatre Squad immediately.

Rules of Using Fog Effects

For a product that mimics smoke, it should come as no surprise that there are certain rules need to be followed. The Little Theatre is protected by a parallel fire alarm system that monitors smoke particles in the air and has sensors for extreme heat indicating a fire. During a performance where fog effects are used, the theatre is equipped with a bypass switch to silence the alarms from sounding if tripped. Before using the bypass system, read and retain all of this section, and become very familiar with the bypass protocol below. This protocol breakdown is also hanging above the switch in the booth for easy reference.

Avoid aiming fog at a smoke detector in the ceiling, and as best as possible, avoid fog lingering too long around a detector. Quick-dissipating usually does not last long enough to reach and set off an alarm, so if an effect permits, it is highly suggested.

Haze involves much more planning. Haze lasts much longer and disperses through the air more easily than fog. With this in mind, haze can wreak havoc on a fire alarm system testing for smoke particles. Haze taken through any ventilation system or drifting into unsilenced hallways can trip alarms. Planning for where haze may drift or which alarms may be silently tripped will save an evacuation and response from Worcester Fire Department. Following the set fire alarm protocol and performing test runs of the desired effects will best prepare and finalize the effect and needed precautions.

The Lighting Ten Commandments

1. Thou shall use either Tie line or zip ties. If thou useth tie line, use diagonal cutter, not knives to remove the zip ties.

2. All lighting equipment must have a safety, there are no exceptions

3. Use shortest possible cable, while still having the cable follow the grid

4. Respect all equipment

5. Use the Base Plot sparingly

6. If you find it broken, fix it.

7. If you don't know how, ask

8. When in doubt contact the Little Theater Squad

9. If you drop anything on a ladder, yell "Heads"

10. At all times in the theatre, remember "safety first"

FIRE ALARM BYPASS SWITCH PROTOCOL
June 2007

Normal to Bypass
1. Get approval from the WPI Police department at least one day in advance so they are aware of what effects will be used, when, and for how long the system will be silenced.
2. The night of the event, the Stage Manager should call Campus Police at 508-831-5433. Give them your name and say you are at the Little Theatre and are switching the alarms into bypass mode for the show or demonstration previously approved. Also give them a contact number to reach you just in case, such the stage manager's cell phone number.
3. Countdown with the dispatcher "Switching to bypass on three, one…two…three."
4. They will silence the alarms on their computers. Make sure there are no issues with the police, and then you may hang up.

Bypass to Normal (Alarms Are Tripped)
1. A tripped alarm is indicated by a solid light on the fire alarm (see photos). If you know the cause of the alarm getting tripped (blowers took in haze, fog aimed at an alarm, etc) then call the WPI police department at 508-831-5433, introduce yourself and explain that you are in the Little Theatre and a fire alarm has been tripped, but you know the cause. Make sure that any fog or haze effects in the air have cleared entirely, by dissipating or clearing out through the side door on the staircase to the green room. This way the alarms will not continue to trip once returned to normal.

Figure : If either of these lights are solid red, this indicates an alarm has been tripped.

2. Because the system is silenced, the alarms will not sound until it is switched back to normal. A police officer needs to respond here and manually reset the alarms on the panel. The dispatcher will be able to direct an officer on duty to respond. Hang up with the dispatcher so as not to tie up the police phone. A production member must stay in the theatre until an officer can respond.
3. Once the officer has reset the alarms, call the dispatcher back and countdown "Switching to normal on three, one…two…three."
4. If no alarms sound, then you may hang up.

Bypass to Normal (No Alarms Tripped)
1. Make sure that any fog or haze effects in the air have cleared entirely, by dissipating or clearing out through the side door on the staircase to the green room, and that no alarms have solid red lights as shown in above photos.
2. If none have been tripped, call the WPI police department at 508-831-5433. Introduce yourself and say you're from the Little Theatre calling to switch back into normal mode.
3. Countdown with the dispatcher "Switching to normal on three, one…two…three."
4. If no alarms sound, then you may hang up.

IF THE FIRE ALARMS SOUND, EVACUATE IMMEDIATELY OUT ONE OF THE EMERGENCY EXITS AND WAIT FOR WORCESTER FIRE BEFORE REENTERING

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Appendices

Appendix A

Inventory of Lighting Equipment in the Little Theatre

As of 6/17/07

Note on tape: blue = 20 ft, red = 10 ft, green = 5 ft, black = 1ft, orange= 10 ft, purple = 5 ft.
Colors can be combined to show multiple lengths.

Amount	Item	Notes	Location
Lighting Instruments			
60	Ellipsoidal	20 of them 36 degrees. 40 of them 50 degrees.	Grid
40	Fresnel		Grid
13	Par-16 w/ 2 prong edison		Shelf under stairs
3	Par-16 w/ 3 prong edison		Shelf under stairs
Lighting Accessories			
5	Barn doors		Shelf under stairs
2	Boxes of gels		Masque Office
58	Ellipsoidal gel holders		Shelf under stairs
34	Fresnel gel holders		Shelf under stairs
4	Gobos		Masque Office
20	Gobo holders		Shelf under stairs
1	Iris		Shelf under stairs
87	Large black safeties		Shelf under stairs
5	Large silver safeties		Shelf under stairs
16	Par-16 gel holders		Shelf under stairs
2	Older gobo holders		Shelf under stairs
30	Small black safeties		Shelf under stairs
Cables			
3	15 ft Black edison extension cable		Bench 1
2	15 ft Black edison extension cable	w/ 3 female and 1 male plugs	Bench 1
1	6 ft Blue cat-5 cable		Booth
3	Coils of wire	about 100 ft in total	All but 1 in Repair Kit. 1 in Shelf under stairs
1	10 ft DMX cable		Shelf under stairs
1	25 ft DMX cable		Shelf under stairs
1	50 ft DMX cable		Shelf under stairs

1	100 ft DMX cable		Shelf under stairs
1	25 ft Extension cable, blue	not grounded	Bench 1
1	25 ft Extension cable, orange		Bench 1
1	25 ft Extension cable, orange w/ black stripe		Bench 1
1	28 ft Extention cable (zip-line)		Bench 1
1	48 ft Extension cable, orange		Bench 1
1	50 ft Extension cable		Bench 1
1	51 ft Extension cable, orange		Bench 1
1	100 ft Extension cable		Bench 1
2	IEC Power cable		Booth
3	12 ft RCA cable		Booth
3	18 ft Rope light		Bench 2
1	48 ft Rope light		Bench 2
1	9 ft Speaker cable		Booth
1	100 ft Speaker cable		Booth
1	3 ft Stage pin cable		Rack
26	5 ft Stage pin cable	22 of them purple	Rack
1	6 ft Stage pin cable		Rack
51	10 ft Stage pin cable	50 of them orange	Rack
1	13 ft Stage pin cable		Rack
3	20 ft Stage pin cable		Rack
1	26 ft Stage pin cable		Rack
1	27 ft Stage pin cable		Rack
2	30 ft Stage pin cable		Rack
3	50 ft Stage pin cable		Rack
25	Two-fer cables		Rack
2	100 ft VGA cable		Booth
7	White surge protectors		Bench 1
1	25 ft XLR cable		Booth
1	80 ft XLR cable		Booth

Cable Accessories

4	Bags of rope light hangers		Scene Shop
1	Female edison		Repair Kit
2	Female stage pin connectors		Repair Kit
5	Female twist locks		Scene Shop
4	1 ft Male stage pin to Female edison connector		Bench 2
3	4 ft Male stage pin to Female edison connector		Bench 2

1	5 ft Male stage pin to Female edison connector		Bench 2
1	45 ft Male stage pin to Female edison connector		Bench 2
7	Male twist locks		Scene Shop
1	Pack of assorted wire mounts		Repair Kit
1	Pack of replacement stage pins		Repair Kit
2	Pack of strain relievers for stage pin connectors		Repair Kit
1	Pin splitter		Windowsill in Booth
3	RCA female to female connector		Repair Kit
1	Replacement edison head		Repair Kit
2	Replacement stage pin heads	pack contains 3	Repair Kit
4	Sockets		Scene Shop
2	Tri-tap, orange		Bench 2
1	Tri-tap, white		Bench 2

Fog Machine and Accessories

1	5 ft Black dryer vent hosing		Under lockers
1	10 ft Black dryer vent hosing		Under lockers
1	Blower		Top of lockers
1	DMX Control for Fog Machine		Top of lockers
1	European extension		Top of lockers
1	Fog machine		Top of lockers
1	Fog silencer		Top of lockers
1	Grid hanging tray for fog machine		Top of lockers
1	Manual Control for Fog Machine		Top of lockers
1	21 ft 7-pin XLR		Top of lockers

Projector and Accessories

2	Camera mounts		Green Room Boxes
1	Projector		Booth
2	Projection boxes		Green Room Boxes
1	Projector dress kit		Theatre
1	Projector screen		Theatre

Tools

12	2 inch Brushes		Scene Shop
2	Dust remover cans		Booth

1	English allen key set		Repair Kit
1	E-tape, black		Repair Kit
1	E-tape, blue		Repair Kit
1	E-tape, green		Repair Kit
1	E-tape, red		Repair Kit
1	E-tape, white		Repair Kit
1	E-tape, yellow		Repair Kit
1	Eye-glass flat head screw driver		Repair Kit
1	Flat head screw driver		Windowsill in Booth
1	Hammer		Windowsill in Booth
5	Ladders	1 blue, 1 orange, 1 large wood, 2 small wood	Theatre
2	Pairs of Utility gloves		Windowsill in Booth
1	Ratchet screw driver		Windowsill in Booth
2	Scissors	one off-set	Windowsill in Booth
1	Tape measure		Repair Kit
5	Utility knives		Windowsill in Booth
72	White gloves		Booth
9	Wrenches	4 gripped, 5 not gripped.	Windowsill in Booth
1	X-acto knife		Windowsill in Booth

(Should always be at least 1 of each kind of Fog Fluid and at least 10 of the other expendables)

Expendables

N/A	Assorted screws for stage pin connectors		Repair Kit
N/A	Bag of zip-ties		Shelf under stairs
N/A	Box of tie-line		Shelf under stairs
N/A	Ellipsoidal hallgen lamps		Booth
N/A	Ez Kleen Fog Fluid Cleaner		Top of lockers
N/A	Fresnel hallgen lamps		Booth
N/A	Mini zip-ties		Repair Kit
N/A	Molecular Fog Fluid		Top of lockers
N/A	Long life soft white 100 watt bulb		Booth
N/A	Par-16 spare lights		Shelf under stairs
N/A	Pro Beam Fog Fluid		Top of lockers
N/A	Quick Dissipating Fog Fluid		Top of lockers
N/A	Regular Fog Fluid		Top of lockers
N/A	Regular Fog Fluid		Top of lockers
N/A	Regular Haze Fluid		Top of lockers
N/A	Spade connectors		Repair Kit
N/A	Various small nuts and bolts		Booth

Miscellaneous

1	Back-up disk		Booth
1	Camera box		Booth
2	Data disks for lighting board		Booth
1	6 channel portable Dimmer		Above grey lockers
3	Electrical boxes		Scene Shop
1	Electrical box face plate		Scene Shop
2	Exit Signs	have extra red and green filters	Booth
1	Flex light		Booth
1	Hub		Booth
1	Lighting board		Booth
1	MI transformer		Repair Kit
1	Monitor		Booth
1	Musical keyboard		Booth
1	46 ft Nylon rope, white		Bench 2
1	6 ft Nylon strap		Repair Kit
1	power cable for lighting board		Booth
1	Power cable to hub		Booth
1	Salt		Windowsill in Booth
1	Set of case covers for sound board		Booth
1	Space heater		Booth
1	Swivel light arm	has no light	Scene Shop

Appendix B

Photometrics charts (50 degree)

Ground Distance (ft.)	0	4	8	12	16	20
Beam Diameter (Head Level)	3.357083278	4.109198695	5.807928311	7.861905632	10.05574963	12.31493616
Beam Diameter (Floor Level)	6.615428812	7.027048039	8.137931033	9.710996365	11.55906531	13.57024476
Field Diameter (Head Level)	5.405717474	6.616805528	9.3521718	12.65957295	16.19219334	19.83003104
Field Diameter (Floor Level)	10.65244326	11.31524995	13.10404072	15.63705705	18.61289583	21.85138204
Luminosity (Head Level)	945.5605536	631.1016166	315.9156069	172.4082019	105.386425	70.26664952
Luminosity (Floor Level)	243.4992203	215.8080948	160.9109377	113.0019642	79.75687705	57.86796548
Head Distance	5.666666667	6.936217349	9.803627447	13.27068616	16.97383608	20.78728244
Floor Distance	11.16666667	11.8614689	13.73660964	16.39190179	19.51139268	22.90620974
Grid Height (ft.)	11.16666667	11.16666667	11.16666667	11.16666667	11.16666667	11.16666667

Beam Angle (Radians)	0.575958167	0.575958167	0.575958167	0.575958167	0.575958167	0.575958167
Field Angle (Radians)	0.890117167	0.890117167	0.890117167	0.890117167	0.890117167	0.890117167
Beam Angle	33					
Field Angle	51					
Multiplying Factor	0.87					
Candlepower	34900	34900	34900	34900	34900	34900
Adjusted Candlepower	30363	30363	30363	30363	30363	30363

Appendix C

Blank Plug Chart

	1 to 6		37 to 42
	7 to 12		43 to 48
	13 to 18		49 to 54
	19 to 24		55 to 50
	25 to 30		61 to 66
	31 to 36		67 to 72

2-fer **Channel**

50° 36° Fresnel Gel
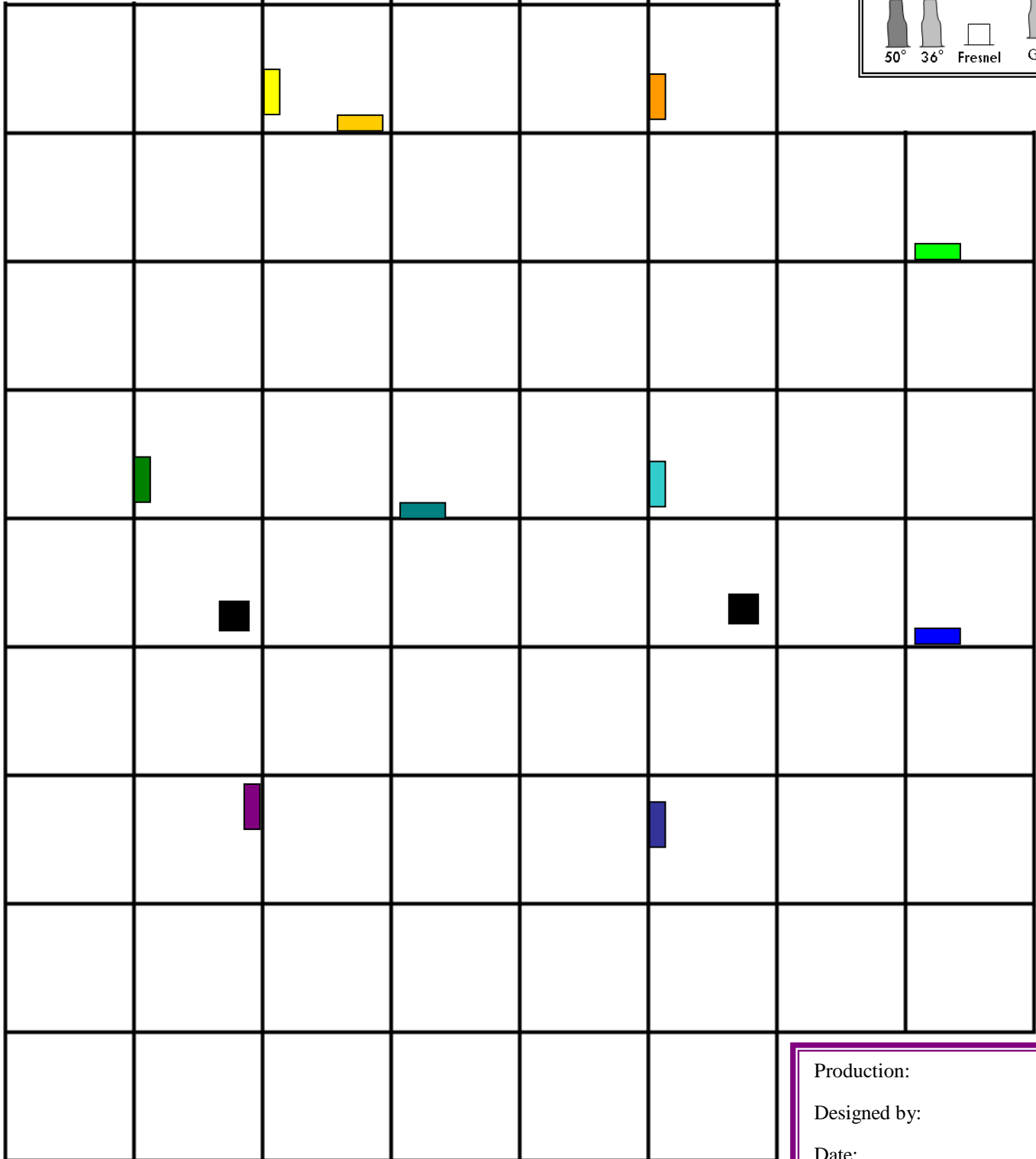
Production:

Designed by:

Date:

Worcester Polytechnic Institute
Little Theatre

Glossary

Areas – "Sub-divisions of the total acting area into the sections over which independent selective control of light is required." [26]

Backlight – "Light coming from behind actors or pieces of scenery to separate them from their background."[27]

Barn Doors – A four-shutter rotatable device used on fresnels to shape the light and reduce scattered light. [28]

Beam Angle – A term used in photometrics that describes where the light output falls to 50% of the center output.

Booth (Control Booth) – The room in the back of the theatre which contains the lighting board and sound system. Control of both sound and light during a show is done from this room.

CAD – Computer Aided Design. In lighting design CAD is used by a Lighting Designer to create their plot.

C-clamp – Part of a lighting instrument that allows the instrument to be hung from the grid. [29]

Channel – "A complete control path from the lighting board, through the processing system, to the dimmer rack". [30]

Cools – A category of gel colors, often used to light an actor's face. Cool colors are violets, blues, cyans, and greens.

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[26] Francis Reid, The ABC of Stage Lighting (New York: Drama Book Publishers, 1992), 3.
[27] Reid, op. cit., p.5.
[28] Reid, op. cit., p 6.
[29] Reid, op. cit., p 17.
[30] Reid, op. cit., p 19.

Cue – "The signal that indicates a change of any kind." [31] In the case of lighting cues contain information on how the light from the lighting instruments should change.

Cue Number – The number assigned to a particular cue.

Cue Sheet – A plot which details timing and actions against each cue number.[32]

Cue Stack - A numerical listing of cues from lowest number to highest number.

Dead Hang – Refers to hanging a lighting instrument straight down from the grid. It may or may not be connected to a plug.

Diagonal Cutters- A tool used for cutting zip-ties.

Dimmer – A device "which controls the amount of electricity passed to a light and therefore the intensity of that light's brightness." [33]

Dimmer Card – In the Little Theatre, a piece of equipment composed of two dimmers in the dimmer rack.

Dimmer Rack – An assembly of individual electronic dimmers mounted in a cabinet.

Downlight – "A light focused vertically down." [34]

Dry Ice – Solid carbon dioxide which sublimates below room temperature to create low lying fog effects.

Electricians – A Master Electrician's lighting crew.

Ellipsoidal – A type of lighting instrument that provides a sharp defined area of light.

Field Angle – A term used in photometrics that describes the distance in degrees to where the beam of light is 10% of the intensity of the light at the center of the beam.

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[31] Francis Reid, The ABC of Stage Lighting (New York: Drama Book Publishers, 1992), 30.
[32] Ibid
[33] Reid, op. cit., p 35.
[34] Reid, op. cit., p 38

Fresnel – A type of lighting instrument used to provide general wash light.

Fog – A liquid that when used in a fog machine creates a type of smoke that is dence.

Gel – A color polymer that is placed in front of a light to change the color of the light.

Gel Frame – A metal rectangular frame used to hold a gel.

Gobos – A pattern for lights used to project images onto a flat surface.

Gobo Holders – A metal frame designed to hold a gobo.

Haze – Thin fog that lingers in the air evenly for light to bounce off of and creates visible light beams.

Houselights – Lights that illuminate the theatre so the audience can get to their seats. Often will set the mood or tone for a show.

Iris – An adjustable circular shutter for an ellipsoidal.

Lighting Board – The piece of equipment which contains all the tools needed to control the lights in the theatre.

Lighting Designer – The person in a production who creates the lighting design.

LT Squad Lighting - The Little Theatre Squad member who manages lighting equipment in the Little Theatre.

Master Electrician – The person in a production who takes the Lighting Designer's design and directs the hanging, gelling, focusing, and cabling of instruments needed.

Output Level – A term used in photometrics that refers to how bright a beam of light is.

Photometrics - A method for describing the output of an instrument.

Plug Box – A box hung in the grid where the cable from a light is plugged into.

Safeties – A cable that is attached to a lighting instrument and the grid to prevent a light from falling.

Stage Pin – The type of power cable used in fresnels and ellipsoidals.

Submaster - A group of channels recorded at proportional levels and controlled by a slider and a bump button

Vice President: Master Electrician of Masque – This person is an officer in Masque and acts as a mentor to Lighting Designers and Master Electricians.

Warms – A category of gel colors, often used to light an actor's face. Warm colors are purples, magentas, reds, oranges, ambers and yellows.

Wash – Light focused to cover a wide area.[35]

5-pin XLR cable – A type of cable that has five pins, often called DMX cable.

3-pin XLR cable – A type of cable that has three pins.

Yoke - The main support for a light. It connects the light to the c-clamp.

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[35] Reid, op. cit., p 126.

Project Appendices

Appendix A: Project Proposal

Project Proposal for IQP: Lighting in the Little Theatre

<u>Advisors</u>: Susan Vick and Dean O'Donnell

<u>Group Members</u>
Patrick Crowe
Lauren Ferrechio
Christopher Kingsley
Richard Pavis
Victoria Zukas

Stage lighting has reinvented itself many times throughout the ages. Greek theatre was performed outdoors, and illuminated the stage with the cheapest and most powerful light around, the sun. The actors were certainly well-lit, but special effects were nigh impossible. Maybe a sunset happened near the end of the performance, but the gods, rather uncreative lighting designers that they were, took care of that. Many plays took advantage of this ever-reliable shift from day to night, but that was the extent of lighting design. Dimmed lighting was still more of an inconvenience than a design feature.

A few centuries later, in Middle Ages, theatre moved indoors, and the first real stage lighting came about. These complex instruments also lit homes during the period, candles. Chandeliers held groups of candles in the air, providing downlight, while footlights with reflectors lit the actors from the stage(Izenour). If the candlewicks were left untrimmed for too long, the room would fill with smoke(Pilbrow), and while the use smoke is one of the greatest innovations of modern lighting design, people of the era would still see smoke and think the building was burning down   Attendants (nicely dressed stage hands) frequently needed to enter the stage and trim the wicks (Gillette).

In spite of their obvious drawbacks, candles introduced rudimentary dimming and blackouts, via snuffing and lighting candles, to the theatrical world. Eventually, someone made metal cylinders and rigged them so that they could lower over the candles (Keller). Now people could turn lights on and off. The one-time gods of theatre (day and night) were deposed! Rudimentary though the technology was, it gave the very first grain of freedom that could eventually grow into a full-fledged art.

As the 16th century ended, Nicola Sabbatini wrote what was arguably the first book on stage lighting: *Pratica di Fabricar Scene, e Macchine ne'Teatri.* Though it is primarily a scenographer's guide, Sabbatini's work branched into stage machinery, sound effects, and lighting. The techniques he described were very basic, mostly concerning blackouts; but he includes details about how they should be used to affect the audience's perception of mood, character, and the play as a unit (Izenour).

By the 17th century, gas lamps had displaced candles as the contemporary lights of choice (Reid). Gas lamps, with their adjustable wicks, allowed for some lights to be brighter than others, yet another huge step forward for the art (Rosenthal and Wertenbaker). The early 1800's heralded the invention of limelight; heat lime with oxygen and hydrogen and it will produce a high intensity, greenish light (Sellman). Theatres used these as a spotlight because they were so much brighter than either gas lamps or candles ever could be. With a little bit of work, limelights could be projected through colored gas, and color had finally become a part of lighting (Shelley).

In 1879, Thomas Edison refined the incandescent electric lamp (Swift). Its advantages in most consumer applications became obvious immediately. Chief among these advantages, they didn't burn. For centuries, theatres were plagued by fire. Well-lit stages were full of fire, and one mistake permanently ended shows. A few years after Edison's invention, the Savoy Theatre in London became the first theatre to install an electrical lighting system (Swift), and by the end of the nineteenth century, most theatres had switched from gas lamps to the safer electric lights (Sellman).

With the dawn of electric lights in the theatre, lighting became something new. Innovations in electricity came quickly, and soon lighting for shows was run by only two or three

people working a switchboard. Electric lamps are bright, so relatively few of them could easily light large areas. Since they don't burn, the lamps could be encased in instruments and be focused precisely to almost anywhere on stage. Less electricity makes less light, so as control over electricity became more sophisticated, dimming became a real possibility. Coloring lights became a matter of what one could put in front of them, and since there was no fire, once could put pretty much anything in front of them. From somewhere between these last three features, the modern art of lighting design emerged.

Through this IQP, we will work to better understand different lighting design theories and realize applications of these lighting techniques within WPI's Little Theatre. Guidelines and procedures will be developed to streamline the process of creating and hanging a lighting design. We will also look at the future of lighting within the Little Theatre, as well as the advantages and challenges of the theatre space.

Each show done in the Little Theatre has its own lighting designer. Rarely has anyone had the chance to design in the space twice. Due to this, during each show the lighting designer has needed to solve some of the basic challenges inherent to the space: low ceilings, defined acting spaces, intense cabling, proximity to the audience, theatre in the round, etc. This IQP will bring the experiences of the past together, describing some of their possible solutions.

Our findings will be presented in a lighting design handbook available to anyone working in the Little Theatre. Upon its completion, this handbook will be accessible across the WPI campus, including the Little Theatre website and Humanities and Arts Resource Library. The handbook will act as a primer on lighting design, with special focus on the peculiarities of the Little Theatre.

Beyond the handbook, this project is will also look into the future of the Little Theatre. While the space is well equipped, time marches on, and technology is constantly improving. This IQP will analyze the Theatre as it is and research how it can be improved, given the funds we have now and may have in the future.

The Little Theatre has notoriously been wanting for space. The only place to feasibly store the instruments is on the grid, and if all of the cabling is taken down, stuffing it under the stairs is really the only option. The equipment in general is only partially organized and there isn't a system in place to account for it all. This IQP team will investigate how to store and organize all of the equipment available to the Little Theatre.

WPI's own Catherine Darensbourg and Elliot Field wrote a play selected to be performed in the Samuel French Off-Off-Broadway Original Short Play Festival. A group of students will perform the show in New York, but before that there will be a preview performance in the Little Theatre. As such, the IQP will create a full lighting design for the preview performance.

Every year several shows are produced in the Little Theatre. With so many productions in one space, the lighting equipment in the grid is in a near-constant state of change. If someone needs to use the theatre between productions to give a demonstration to a class, but wasn't intensely involved with the previous show's lighting, they'll have to hunt down a lighting designer in order to operate the lighting instruments. This project will create a base lighting design to be hung after each show in the Theatre. This design will be a default lighting design that anyone can use, provided there isn't a show in production at the time.

When a lighting designer begins work on a show he needs to know what tools he has to work with. While the final creation is always different, in a space like the Little Theatre the tools

are pretty consistent from one production to another. The equipment currently available to someone working in the Little Theatre has yet to be accounted for in a single document. This project will create a meticulous and thorough inventory of all Little Theatre equipment.

With the development of advanced CAD software, lighting designs in the industry have moved from paper to a digital format. However, each individual space needs to be modeled in detail before a digital design can be made. In order to keep the Little Theatre on the cutting edge, the IQP will create an accurate digital model of the Little Theatre so future designers can easily create digital plots. To do this, we will measure every part of the Little Theatre, from the floor plan to the air ducts, and create a master lighting model.

The Little Theatre website currently has two purposes: it provides publicity for all upcoming shows in the space, and is a repository for any and all projects that have investigated the space. We will include our project on the website so that the information made be reached by students, faculty, and staff at any time.

Lighting design is an integral part of theatre. "Modern lighting creates a world of light that enwraps the actor, linking him with his environment." (Pilbrow, 3) Light sets the mood and gives direction in a performance. A good lighting design enhances a show and a bad lighting design detracts from it. Therefore, anyone who is involved in theatre stands to learn something from lighting design, even if their role doesn't require touching an instrument. Using light and equipment efficiently and effectively improves any theatre space. Through the handbook, suggestions for expansion, and new storage methods this IQP will improve the quality of lighting design in the Little Theatre and, by extension, theatre at WPI.

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Appendix B: Proposed Schedule of Events

May 14th
Project Begins

May 21st
Finish project proposal with articulated project question and bibliography.
Suggest table of contents.
Complete inventory and CAD model.
Begin work on French Vanilla design.

May 25
Humanities and Arts Budget Plan completed.

May 28
Begin work on expansion suggestions for the Theatre.
Find homes for everything.
Create and hang null plot with plug charts.
Create both Samuel French designs.

June 4
Hang both Samuel French designs.
Trip to New York City for Samuel French Off-Off Broadway Original Short Play Festival.

June 5
French Vanilla WPI Performance

June 6
Rack Construction

June 8-9
French Vanilla NYC Performance

June 11
Begin work on Handbook
Update Website.
Create Rough Draft of Portfolio

June 18
Complete Project Portfolio and Handbook.

Appendix C

Base Plot

	1 to 6		37 to 42
	7 to 12		43 to 48
	13 to 18		49 to 54
	19 to 24		55 to 50
	25 to 30		61 to 66
	31 to 36		67 to 72
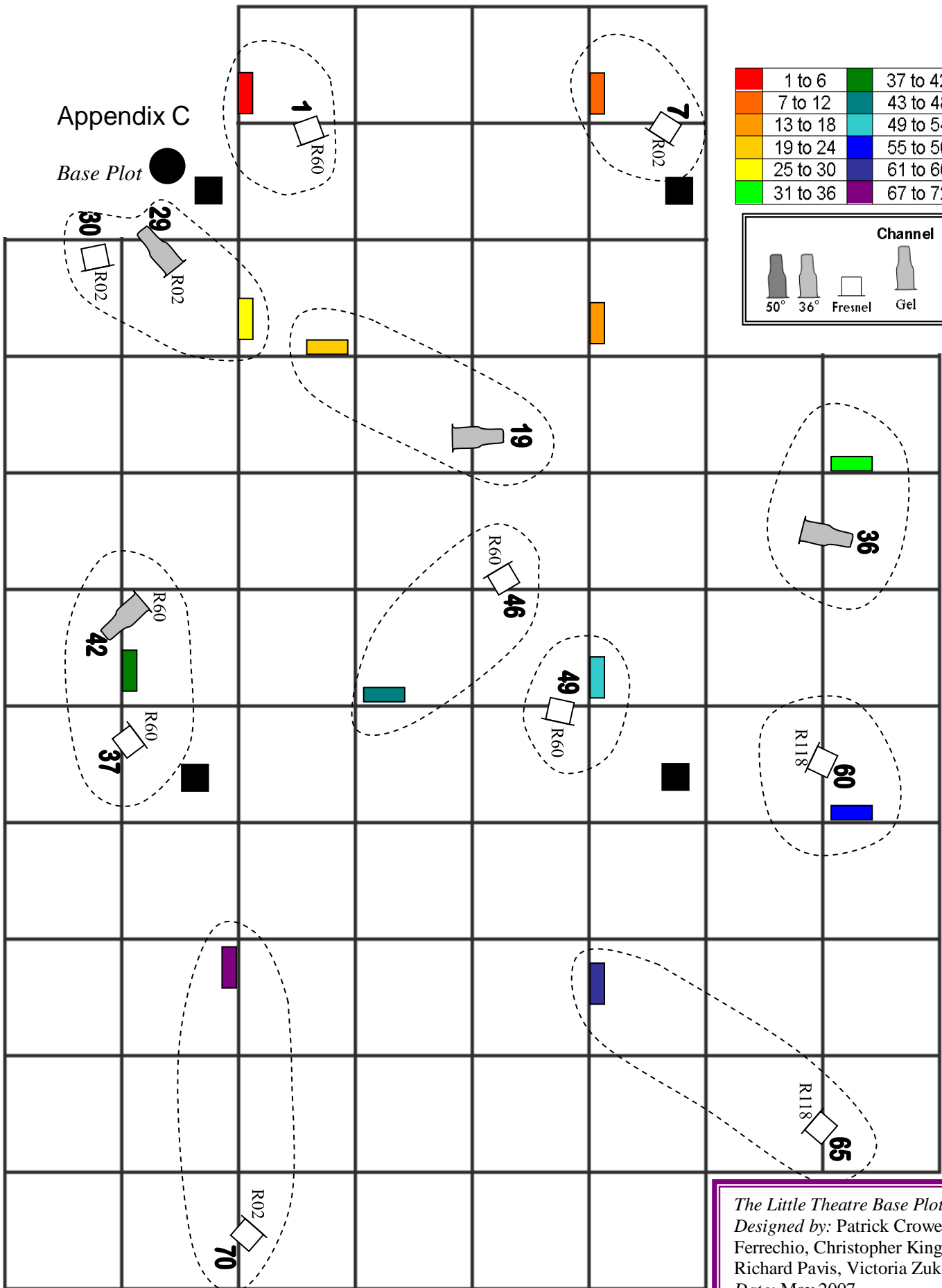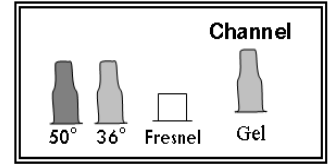
Channel

50°	36°	Fresnel	Gel

1
R60

7
R02

30
R02

29
R02

19

36

46
R60

42
R60

49
R60

37
R60

60
R118

70
R02

65
R118

The Little Theatre Base Plot
Designed by: Patrick Crowe, Lauren
Ferrechio, Christopher Kingsley,
Richard Pavis, Victoria Zukas
Date: May 2007

Worcester Polytechnic Institute
Little Theatre

Appendix D

Base Plot Plug Chart

Channel	Instrument	Area	Position	Color	Gel
1	Fresnel	between columns	wash	cool	R60
7	Fresnel	between columns	wash	warm	R02
29	36 degree	special	front	warm	R02
30	Fresnel	between columns	wash	warm	R02
19	36 degree	special	down	none	n/a
36	36 degree	special	back	none	n/a
46	Fresnel	between columns	wash	warm	R02
49	Fresnel	side stage	wash	none	n/a
42	36 degree	special	front	cool	R60
37	Fresnel	between columns	wash	cool	R60
65	Fresnel	side stage	wash	none	n/a
70	Fresnel	side stage	wash	none	n/a
60	Fresnel	between columns	wash	warm	R02

Appendix E

Base Plot Gel List

Gel	Size		Total
	Ellipsodial	Fresnel	
R02	1	4	5
R60	1	3	4
R118	0	2	2
Total Gels			**11**

Appendix F

French Vanilla Plot

Legend:

Color	Range	Color	Range
(red)	1 to 6	(green)	37 to 42
(orange)	7 to 12	(teal)	43 to 48
(amber)	13 to 18	(cyan)	49 to 54
(yellow-amber)	19 to 24	(blue)	55 to 50
(yellow)	25 to 30	(dark blue)	61 to 66
(bright green)	31 to 36	(purple)	67 to 72

2-fer   Channel

50°   36°   Fresnel   Gel

21
R02

28
R02

25

20
R81

27
R81

35
R3304
& R67

34
R21
& R63

40
R02

R60

R02

47
R02

54

39

38

45
R81

48
R60
R81

43

58
R4760

59
R3304
& R67

41
R60

44

66
R02

67
R60

64

61
R21
& R63

62
R4760

72
R81

71
R81

69

68
R60
R60

The Little Theatre French Vanilla
Design
Designed by: Patrick Crowe, Lauren
Ferrechio, Christopher Kingsley,
Richard Pavis, Victoria Zukas
Date: May 2007

Worcester Polytechnic Institute
Little Theatre

Appendix G

French Vanilla Plug Chart

Channel	Instrument	Area	Position	Color	Gel
25	Fresnel	Seating	wash	none	n/a
25	Fresnel	Seating	wash	orange	R316
39	Fresnel	Seating	wash	none	n/a
39	Fresnel	Seating	wash	orange	R316
41	Fresnel	Seating	wash	none	n/a
41	Fresnel	Seating	wash	orange	R316
67	Fresnel	Seating	wash	none	n/a
67	Fresnel	Seating	wash	orange	R316
28	50 degree	A	front	warm	R02
38	50 degree	A	front	cool	R60
38	50 degree	B	front	cool	R60
40	50 degree	B	front	warm	R02
40	50 degree	C	front	warm	R02
66	50 degree	D	front	warm	R02
69	50 degree	C	front	cool	R60
69	50 degree	D	front	cool	R60
35	Fresnel	A/B	back/house	green	R3304 + R67
34	Fresnel	A/B	back/house	orange	R21 + R63
58	Fresnel	B/C	back/house	pink	R4760
59	Fresnel	B/C	back/house	green	R3304 + R67
61	Fresnel	C/D	back/house	orange	R21 + R63
62	Fresnel	C/D	back/house	pink	R4760
43	36 degree	Haagan Daz	special	none	n/a
20	Fresnel	A/B	house wash	blue	R81
27	Fresnel	A/B	house wash	blue	R81
45	Fresnel	B/C	house wash	blue	R81
48	Fresnel	B/C	house wash	blue	R81
72	Fresnel	C/D	house wash	blue	R81
71	Fresnel	C/D	house wash	blue	R81
21	Fresnel	A/B	side	warm	R02
47	Fresnel	C/D	side	warm	R02
44	Fresnel	A/B	side	cool	R60
68	Fresnel	C/D	side	cool	R60
54	36 degree	table	special	none	n/a
64	36 degree	chair	special	none	n/a

Appendix H

French Vanilla Gel chart

Gel	Size		Total
	Ellipsodial	**Fresnel**	
R02	4	2	6
R21	0	2	2
R63	0	2	2
R316	0	4	4
R3304	0	2	2
R67	0	2	2
R4760	0	2	2
R60	4	2	6
R81	0	6	6
Total Gels			**32**

Appendix I

French Vanilla Cue Chart

Cue	Description
1	House Preset
2	House to half, lights up more on set
3	Blue Out
4	Full Stage
5	Sarah and Chris light
6	Haagan Daz Special
7	Blue Out
8	Curtain Call
9	Blue Out
10	House Preset

Appendix J

Chernuchin Plot
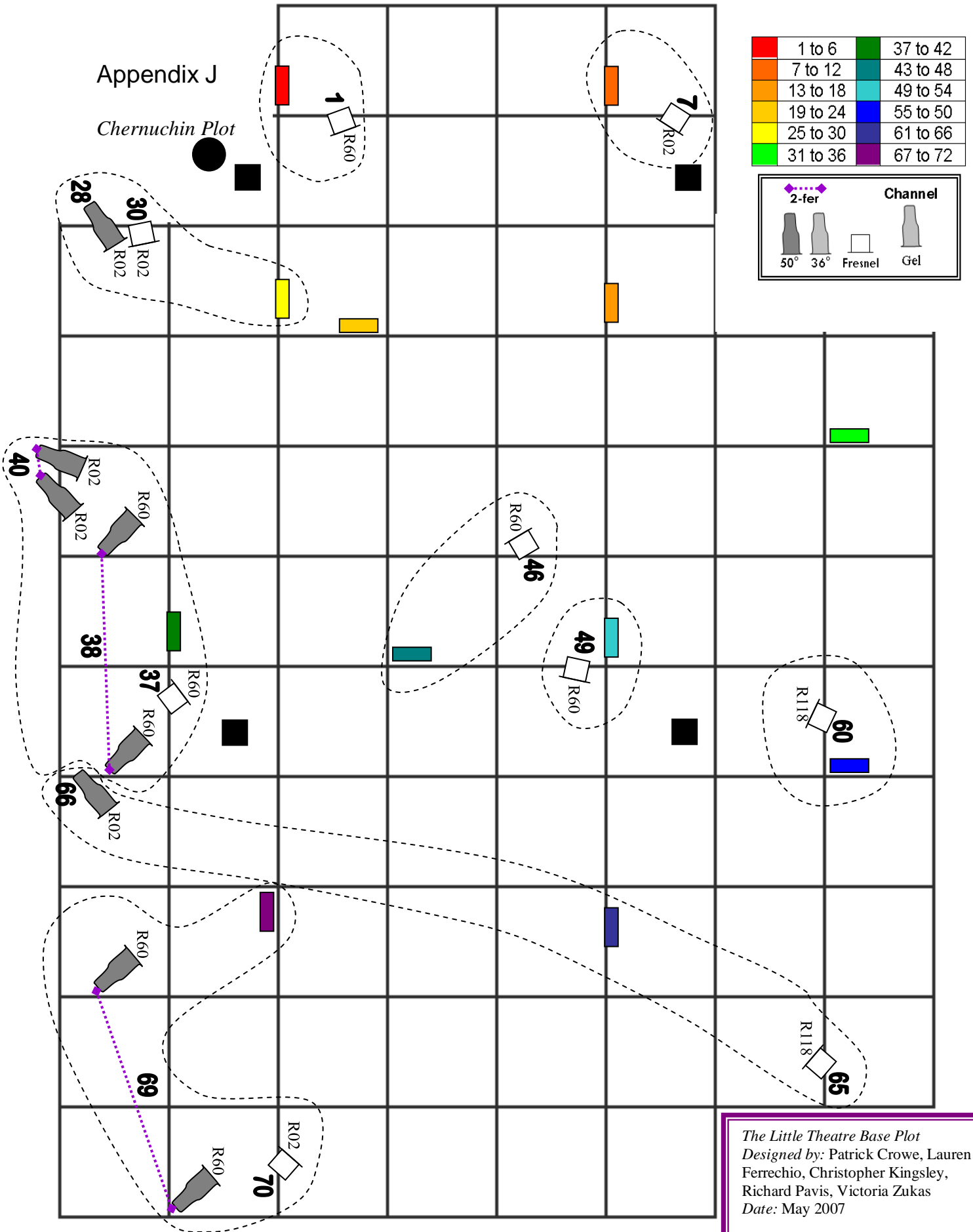
1 to 6	37 to 42
7 to 12	43 to 48
13 to 18	49 to 54
19 to 24	55 to 50
25 to 30	61 to 66
31 to 36	67 to 72

2-fer Channel

50° 36° Fresnel Gel

1 R60

7 R02

28 30 R02 R02

40 R02 R02 R60

38

46 R60

49 R60

60 R118

37 R60 R60

66 R02

69 R60

70 R02 R60

65 R118

The Little Theatre Base Plot
Designed by: Patrick Crowe, Lauren
Ferrechio, Christopher Kingsley,
Richard Pavis, Victoria Zukas
Date: May 2007

Worcester Polytechnic Institute
Little Theatre

Appendix K

Chernuchin Plug Chart

Channel	Instrument	Area	Position	Color	Gel
28	50 degree	A	front	warm	R02
38	50 degree	A	front	cool	R60
	50 degree	B	front	cool	R60
40	50 degree	B	front	warm	R02
	50 degree	C	front	warm	R02
66	50 degree	D	front	warm	R02
69	50 degree	C	front	cool	R60
	50 degree	D	front	cool	R60
1	Fresnel	between columns	wash	cool	R60
7	Fresnel	between columns	wash	warm	R02
30	Fresnel	between columns	wash	warm	R02
46	Fresnel	between columns	wash	warm	R02
49	Fresnel	side stage	wash	none	n/a
37	Fresnel	between columns	wash	cool	R60
65	Fresnel	side stage	wash	none	n/a
70	Fresnel	side stage	wash	none	n/a
60	Fresnel	between columns	wash	warm	R02

Chernuchin Design Cue Chart

Cue	Description
1	House Preset
2	House to Half
3	Glow
4	Full Stage
5	Glow
6	Curtain Call
7	Glow
8	House Preset

Appendix L

French Vanilla Script

<div align="center">

FRENCH VANILLA

A 10-Minute Comedy

By
Cat Darensbourg & Elliot Field

</div>

Catherine Darensbourg
12 Hackfeld Road
Apartment 3
Worcester, MA 01609
(508) 797-5483
electric_oracle@yahoo.com

Elliot Field
2 Abbey Road
Webster, MA 01570
(860) 798-2988
efield@gmail.com

LOG LINE:
Non-romantic, long-term roommates discover they're common-law husband and wife.

RUN TIME:
10 Minutes

CAST:
SARAH – at least mid-20's, addicted to Hagan-Daaz and wearing Chris's stolen
        sweatshirt
CHRIS – Sarah's roommate of several years, Sarah's age range
JAMIE – the new girlfriend Chris hopes to impress, Sarah's age range
DAVE – the current boyfriend Sarah hopes to dump, Sarah's age range

SET:
Living Room of Sarah's and Chris's Apartment.

TIME:
Current Day

PROPS:
Table
Chair (1)
Cell phones (4)
Empty half-pint container of Chocolate Hagan-Daaz (1)
Plastic spoon (1)
Revealing woman's blouse (Sarah's)
Baggy sweatshirt (Chris's, worn by Sarah)

SETTING: CHRIS sits in HALF-LIGHT, text
                                             messaging someone on his cell phone.

AT RISE: Go to FULL LIGHT as SARAH approaches
                                             CHRIS as SARAH eats a pint of Hagen-Daaz.

                          SARAH
So what's her name this time?

                          CHRIS
Only if you share.

                          SARAH
My Hagen-Daaz. Your problem.

                          CHRIS
Jamie's not a problem.

                          SARAH
She owns a name! Thank you for the kindness.

                          CHRIS
            (CHRIS reaches for Hagen Daaz, but SARAH pulls it away.)
No, thank you.

                          SARAH
Still my Hagen Daaz. Still your problem.

                          CHRIS
But –

                          SARAH
You're pay for tonight? After you over drafted our house account?

                          CHRIS
Will groveling work?

                  (SARAH takes another deliberate spoon of ice cream)

                          SARAH
No.

                                                                        118

CHRIS
To grovel means to beg. Sincerely.

                    SARAH
Not impressed. And Jessie—

                    CHRIS
Jamie –

                    SARAH
Jackie will die if you buy burritos with leftover laundry quarters from the load you didn't do today.

                    CHRIS
I never said we were doing Mexican

                    SARAH
It's the third date -- and Mexican hasn't worked since June.

                    CHRIS
June was last year!

                    SARAH
I meant the month, not the ex.

            (CHRIS leans over the table, imploring.)

                    CHRIS
Sarah, I'm begging –

                    SARAH
This doesn't look like begging. Begging has more knees in it.

            (CHRIS falls to his knees. SARAH simply licks her spoon)

                    SARAH
Julie—no Jamie?—doesn't like Mexican.

                    CHRIS
You don't know that.

                    SARAH
I'm a woman. Women don't like Mexican.

CHRIS
Women like margaritas.

                                    SARAH
Margaritas won't be enough …if she has taste.

                                    CHRIS
Jamie has taste!

                                    SARAH
What flavor?

                                    CHRIS
None of your business!

                                    SARAH
Sooner or later we all sleep alone.

                                    CHRIS
Fine. What do you recommend?

                                    SARAH
Somewhere nice, or don't come sobbing to me when the beans bring your evening to an early, explosive conclusion.

                                    CHRIS
Not fair. With Jessie –

                                    SARAH
And Julie. And Jackie. – No you threw up on Jackie.

                                    CHRIS
--One too many margaritas.

                                    SARAH
Try fine French wine.

                                    CHRIS
I've never been to the French place.

                                    SARAH
French restaurants lead to French kissing and you still end up south of the border.

                                    CHRIS

Sounds good – but expensive.

                              SARAH
Live a little.

                              CHRIS
So you'll front me some cash?

                              SARAH
Fine. But I need a man that does laundry.

          (CHRIS reaches for Hagen-Daaz.)

                              CHRIS
Great!

          (SARAH rises and saunters away, spoon in her mouth, before CHRIS snags her
          Hagen-Daaz.)

                              SARAH
I agreed to pay for your French fling, not to fork over my Hagen Daaz.

                              CHRIS
It's chocolate -- not sacred.

                              SARAH
Blasphemer.

                              CHRIS
You're pissed because Dave hasn't called. Wondering if he still likes you?

                              SARAH
Drop it.

                              CHRIS
My dear Watson, you are consuming Hagen Daaz. And you only choose vanilla when you're
happy – or certain you're going to get lucky. But chocolate . . . chocolate is your cold comfort
food. For anger, frustration –

          (SARAH flops onto the chair.)

                              SARAH

Dealing with Mexican food tonight.

                              CHRIS
What?

                              SARAH
Dave adores Mexican. He thinks French is expensive –

                              CHRIS
I love the Mexican place. Why don't we just make a foursome?

                              SARAH
Not tonight.

                              CHRIS
So . . .
            (beat)
Does this mean Dave's…not getting lucky?

            (SARAH takes another spoonful of Hagen-Daaz and looks solemnly bitchy.)

                              SARAH
Do I look vanilla tonight?

                              CHRIS
I see…

                              SARAH
Dave and I need to discuss . . . things. Did I mention I hate Mexican?

                              CHRIS
So Dave's going to die?

                              SARAH
We're negotiating.

                              CHRIS
Like you talked to Ste–

                              SARAH
Leave shmuck-boy out of it. Every relationship is new.

                              CHRIS
Yet mine are cookie cutter?

SARAH

Just the J's.

                              CHRIS

I like J.

                              SARAH

Try the rest of the alphabet.

                              CHRIS

So speaks experience.

                              SARAH

When Dave comes—

          (CHRIS reaches for SARAH's ice cream)

                              CHRIS

--So he is getting lucky.

          (SARAH pulls herself and the ice cream away.)

                              SARAH

Maybe. If he grovels.

          (CHRIS gestures to the floor.)

                              CHRIS

I'll explain about the knees.

          (CHRIS' cell rings.)

                              CHRIS

Hey? It's unlocked. Oh, my roommate's still …

          (JAMIE enters and gives CHRIS a winsome smile. Both put down their cell
          phones.)

                              JAMIE

Hey you.

                              CHRIS

Hey me.

JAMIE

Hey you.

CHRIS

Hey you too!

            (SARAH eats ice cream, disgusted by their mush. As JAMIE and CHRIS get
            intimate, SARAH sighs, making JAMIE jump away from CHRIS.)

JAMIE

Oh! This is….?

CHRIS

Sarah. My roommate.

JAMIE

I thought your roommate was a guy.

SARAH

Surprise.

CHRIS

I'm gonna grab my coat. Oh, Sarah do you have the money you, um … owe me?

SARAH

Owe you? Why don't you get my checkbook? If you kneel down, you'll find it near the desk.

CHRIS

Very funny.

SARAH

Next to my wallet.

CHRIS

Thank you.

            (CHRIS exits.)

JAMIE

Chris wears shirt like that.

SARAH

It's mine until he does laundry.

(CHRIS re-enters.)

                                        JAMIE
He does your laundry?

                                        CHRIS
We've been roommates forever.

                              (SARAH's phone rings.)

                                        JAMIE
I guess.

                                        SARAH
                    (Speaking to caller)
 Hey, come up. You can wait with Chris and –
                    (SARAH looks at CHRIS)
J..ammmmie while I change.

                    (SARAH hands the Hagan-Daaz to JAMIE and exits. CHRIS goes for ice cream,
                    but JAMIE walks away eating ice cream.)

                                        JAMIE
Your roommate's a… Sarrrrrah?

                                        CHRIS
It never came up.

                    (JAMIE glances towards CHRIS's crotch scornfully.)

                                        CHRIS
No! We've been roommates for ages. You know how hard it is to find someone who pays rent
on time?

                                        JAMIE
You two ever date?

                                        CHRIS
No.

                                        JAMIE
Want to?

CHRIS
No.

                                 JAMIE
Where's her girlfriend?

                                 CHRIS
You'll meet her boyfriend in a couple of minutes.

                                 JAMIE
Bet he loves you.

                                 CHRIS
We haven't met.

                                 JAMIE
He knows you're a guy?

                                 CHRIS
Why wouldn't he?

            (DAVE enters hesitantly, then smiles at JAMIE.)

                                 DAVE
Hi… Chris? Nice to meet you. I'm Dave.

                                 JAMIE
Apparently not.

            (CHRIS waves from behind JAMIE.)

                                 CHRIS
She's Jamie. I'm Chris.

                                 DAVE
The . . . roommate?

            (JAMIE hands DAVE the ice cream.)

                                 JAMIE
This will help.

            (JAMIE goes and sits. CHRIS goes for the ice cream. DAVE walks away with it

                                                                            126

before CHRIS can grab it. DAVE looks curiously at JAMIE.)

                                        JAMIE
Chocolate. Cold comfort food.

                                        DAVE
I didn't know Sarah's roommate was . . .

                                        JAMIE
I didn't know your date was . . . either

                                        DAVE
Chris, are you and Sarah exes?

                                        CHRIS
It's not like that.

                                        JAMIE
She just pays the rent.

                                        CHRIS
On time! It's not like she supports me. We share things.

                                        JAMIE
Clothes . . .

                                        CHRIS
I grabbed her socks by mistake – once.

                                        DAVE
Socks aren't so bad.

                                        JAMIE
Sarah's wearing his things now.

                                        DAVE
Really?

                                        CHRIS
I loaned her some stuff.

                                        DAVE
What? Why?

CHRIS

Only because I haven't done laundry.

(SARAH returns, wearing a revealing shirt and spins for DAVE to admire her.)

DAVE

Oh my.

SARAH

Like it?

(DAVE glances at CHRIS.)

DAVE

Nice.

SARAH

Huh?

(CHRIS stalks over to SARAH, muttering.)

CHRIS

Make him grovel.

JAMIE

You picked someplace for dinner?

CHRIS

I know this French place --

DAVE

Sarah and I are doing Mexican

JAMIE

I love Mexican. Dave, you're so lucky!

(CHRIS reaches for ice cream DAVE is holding.)

CHRIS

Survey says --!

DAVE

What?

                              CHRIS
Just bend your knees and all may be well.

          (SARAH takes ice cream back from DAVE.)

                              SARAH
Ready?

                              DAVE
I'm sorry, but it bothers me my girlfriend's long-term roommate is a guy—and she never
mentioned it.

                              SARAH
I blab about Chris all the time.

                              DAVE
Yeah, "Chris and I stayed up late and watching chick flicks. And I can't go out Thursday
because Chris and I are going shopping."

                              SARAH
We shop on Thursdays.

                              DAVE
Every Thursday you go shopping?

                              SARAH
We eat every week

                              JAMIE
Awww, grocery shopping. Together.

                              DAVE
Who cooks?

                      CHRIS and SARAH
I do.

                              SARAH
I cook. You microwave.

                              CHRIS
Fine. You cook more than I do.

JAMIE

Who pays bills?

                              SARAH

I do.

                              DAVE

Who wears the pants?

                              JAMIE

Sarah – until Chris does the laundry.

                              SARAH

That's not fair.

                              DAVE

How long have you lived together?

                              CHRIS

Six years.

                              SARAH

Six and a half.

                              CHRIS

Six and a half.

                              DAVE

You've been together –

                              JAMIE

Six and a half years.

                              DAVE

Seven would make you common law.

                              SARAH

We met in college, freshman year . . .

                              CHRIS

Went through grad school . . .

SARAH

Never stiffed each other on the rent. . . .

                              JAMIE

That's not the stiffing we were worried about.

                              CHRIS

She's not my type.

                              SARAH

And I'm not interested.

                              DAVE

Prove it.

                              CHRIS

If we were, we wouldn't chase other people.

                              SARAH

Totally true.

                              DAVE

You wouldn't be the first.

                              JAMIE

What's the longest you've both dated anyone?

                              CHRIS

Me? A year and a half! Jackie.

                              SARAH

Actually, no. One lasted two years and seven months.

                              DAVE

Who?

                              JAMIE

Who?

                              CHRIS

No, I didn't –

                              SARAH

You met June at the bank. You just didn't ask her out for eight months.

                              DAVE
Eight months?

                              SARAH
He got all our quarters at the branch across town – not that he ever uses them.

                              CHRIS
But that's not dating.

                              DAVE
And you, Sarah?

                              CHRIS
That's easy. For three years, she was ga-ga over Ste–

                              SARAH
Don't mention his name!

                              CHRIS
--Shmuck-boy.

                              SARAH
Okay. And it wasn't three years.

                              CHRIS
Was too.

                              SARAH
On-again-off-again does not three years make.

                              DAVE
So have we agreed on a timetable here?

                              JAMIE
Was that while Chris was dating June?

                              SARAH
Some of it –

                              CHRIS
Most of it, because you almost moved in with him.

JAMIE
And why didn't you? Move in with –

                    CHRIS
Shmuck-boy.

                    SARAH
Finances –

                    CHRIS
Rent here's cheaper –

                    JAMIE
How understandable.

                    DAVE
Well she does pay. On time.

                    CHRIS
No – we had that all worked out when she found out –

                    DAVE
What?

                    SARAH
I was dessert, not the main course.

                    JAMIE
So Shmuck-boy was into some other chick?

                    CHRIS
At least his tongue.

                    DAVE
He cheated?

                    CHRIS
My deduction—so I tailed him.

                    JAMIE
So Sherlock ran and told Sarah . . .

                    CHRIS

She's my friend.

                              DAVE
Established!

                              SARAH
Would you rather he didn't say anything?

                              DAVE
I'm not saying –

                              SARAH
Then what? Cheatings okay? And other people should cover?

                              DAVE
Not cover –

                              SARAH
Then what?

                              DAVE
You should have just found out some other way, on your own –

            (SARAH shoves ice cream to CHRIS.)

                              SARAH
After I'd moved in?

            (CHRIS smiles, and starts to dig in.)

                              CHRIS
Can you say 'grovel'?

            (JAMIE snatches ice cream from CHRIS before CHRIS gets a taste.)

                              JAMIE
Not so fast.

                              CHRIS
Bu—but—

                              JAMIE
Sarah, ever ask your boyfriend why he kissed another woman? Or did you just dump him?

SARAH

What's to ask?

DAVE

You know for a fact Chris saw them kissing?

SARAH

Chris would never lie to me.

DAVE

Because you trust him?

SARAH

No – because his nose twitches like a bunny-rabbit's when he lies.

CHRIS

Does not.

SARAH

That's how I knew you hated Jackie.

CHRIS

But –

JAMIE

Do you want to date me, Chris?

DAVE

Or do you prefer Sarah?

JAMIE

Have a thing for her?

CHRIS

Uh –

DAVE

I saw a twitch.

CHRIS

I didn't say anything!

SARAH

That's not fair. It was only a half-twitch. And we're not interested in each other.

                                JAMIE
Why hasn't Chris moved out yet?

                                SARAH
Because every time he finds someone, she gets jealous.

                                JAMIE
Only when you wear his clothes.

                                SARAH
If he just did laundry –

                                DAVE
I do laundry.

                                CHRIS
What?

                                DAVE
            (to SARAH)
You didn't tell – ?
            (to CHRIS)
You're going to need a new roommate.

                                SARAH
No! I haven't decided yet!

                                JAMIE
Yes, you have.

                                SARAH
Huh?

            (JAMIE points to Hagen-Daaz.)

                                JAMIE
Incriminated by ice cream!

            (DAVE looks to JAMIE, shaking his head.)

DAVE
Well done, Watson. Case closed! Shall we have Mexican?

                              JAMIE
Few margaritas.

                              CHRIS
Then we can all have Mexican -- !

                              JAMIE
Who said you were invited?

                              DAVE
You and Sarah need to talk.

                              SARAH
Why? Just because of a seven-year twitch –

                              JAMIE
You do live together. Wear each other's clothes . . . Shop together.

                              DAVE
All the IRS needs is a shared bank account and they'd call you married.

          (CHRIS and SARAH exchange looks.)

                              JAMIE
Are you kidding me?

                              SARAH
No! It's not like that!

                              CHRIS
We do not have sex and we want to date other people!

                              DAVE
Looks like a duck –

                              JAMIE
Quacks like a duck –

                              SARAH
You can both just go –

CHRIS
Sarah!

                              SARAH
--a duck!

                              DAVE
Sarah, I'm sorry. It wouldn't work.

                              SARAH
But I wanted to break up with you!

                              DAVE
See? Three's a crowd. Jamie?

                              JAMIE
Chris –

            (JAMIE looks down at ice cream.)

                              JAMIE
If only you –

                              CHRIS
What?

            (JAMIE hands CHRIS ice cream with a disappointed sigh, then nods at DAVE.)

                              JAMIE
--liked Mexican. I'm ready for margaritas, now.

            (DAVE and JAMIE exit, arm-in-arm. CHRIS is left scraping the empty ice cream
            container with the spoon.)

                              CHRIS
He's going to get so lucky.

                              SARAH
Won't last the month.

                              CHRIS
But tonight --

SARAH

Who knows? Who cares?

                              CHRIS

I hate France.

                    (SARAH shrugs, then turns to leave.)

                              SARAH

Hey. Cheer up.

                              CHRIS

Why?

                              SARAH

There's more Hagen Daaz in the freezer.

                              CHRIS

Chocolate? Or . . . French Vanilla?

                              SARAH

Guess.

          (SARAH departs. After a beat, CHRIS considers his empty ice cream carton, and then
          quickly follows after her.)

                         <u>END OF PLAY</u>

Appendix M

Log of Emails

to ltiqp07-crew@wpi.edu
cc rosco349@gmail.com
date May 24, 2007 9:51 AM
subject FW: Little Theatre Fire Alarm situation
mailed-by wpi.edu

Hey guys,
We have a meeting with these folks at 11am today to talk about the alarms, so
if you are available come on down to LT. This way we can discuss what
happened in our meeting, and Paul if you are available, maybe you have more
information on the system as it is now, so you are welcome to come too. It's
Captain Beaton and Officer Dylewicz whose in charge of fire alarms on campus.
See you later,
Lauren

Lauren Ferrechio

_____

From: Martunas, Cheryl A
Sent: Thu 5/24/2007 7:09 AM
To: Ferrechio, Lauren
Cc: Dylewicz, John E.; Beaton, Roderick J
Subject: RE: Little Theatre Fire Alarm situation

Rod/Jay,

could you both meet with Lauren and coordinate and address this concern. I
authorized them earlier in the week to follow the same protocol as the little
theatre as you can see some issues arose.

Thanks, Chief

_____

From: Ferrechio, Lauren
Sent: Wednesday, May 23, 2007 8:28 PM
To: Martunas, Cheryl A
Subject: Little Theatre Fire Alarm situation

Hello Chief Martunas,

I emailed you a few days ago to ask about using haze in the Little Theatre,
and as I'm sure you heard, the fire alarms still went off even though we
followed the procedure in place now. We are an IQP group and part of it is
improving these procedures, so I was wondering if you would be available to
discuss the fire alarm situation or could direct me to whoever is in charge

of the alarms.

What caused the alarms to go off this time was an oversight on our part, there are blowers in here that we thought were off, but turned on once we were in bypass mode. We quickly turned them off, but because it took in air that had haze, that tripped the alarm in here. There is a light on the fire alarm that indicated to us that it had been tripped. Because of this, no matter what we did, once it was switched back to normal alarm mode, the alarms would sound. We were wondering if it were possible to have an officer come down in these situations and turn the alarm off as they would in any fire alarm, but while we were still in by pass mode to avoid all of Riley Hall evacuating. Once that was clear, we would return to normal mode. In theory, if there were an actual fire in the theatre or anywhere else in Riley, it would retrip once returned to normal mode, and then Worcester fire would respond as necessary. This would avoid huge costs to the school by avoiding Worcester fire responding. I understand its a safety concern, but the way the protocol is designed now, it restricts many effects we would like to include in theatre productions here as well as causing costly false alarms.

I have a meeting tomorrow from 12-2, but otherwise I am available if we could schedule a meeting, this week if possible.

Thank you very much,
Lauren

From: Dylewicz, John E.
Sent: Monday, June 04, 2007 7:48 AM
To: Martunas, Cheryl A
Cc: Ferrechio, Lauren
Subject: RE: Little Theatre Fire Alarm situation

Chief,

I met with the students (Lauren Ferrechio & Co.) doing this IQP and we determined that the fire alarm was activated because the bypass switch was used too soon (i.e. the blowers in the ceiling had not had sufficient time to remove all the smoke in the area of the (2) affected smoke detectors). The students are requesting an Officer be sent to the Little Theater, after a performance, to determine when the bypass switch should be switched back to normal. I stated that we can do that if the Officers are not tied up.

Jay

From: Martunas, Cheryl A
Sent: Mon 6/4/2007 9:13 AM
To: Dylewicz, John E.
Cc: Ferrechio, Lauren
Subject: RE: Little Theatre Fire Alarm situation

Jay,

please handle notifying the appropriate shift supervisor and dispatcher.

thanks, Chief

To whom it may concern

As part of the project we've typed up a very detailed protocol for the bypass
system that will hang in the booth for the student who is in charge of that
show. I'd be happy to send this to you to look over it and so dispatchers may
have a copy to follow as well, so both parties are on the same page.

As for the officer responding, that would only be in the situation that know
an alarm has been tripped. We can see that because the red light on an alarm
stays constant, instead of the usual blinking. Only when we know one has been
tripped would we request an officer to reset the alarm to avoid the alarms
sounding and the evacuation of Riley Hall, and then we would switch back to
normal. If no alarms have been tripped and the fog/haze has been cleared out,
the alarms can be switched back to normal without an officer.

Thanks,
Lauren

From: Martunas, Cheryl A
Sent: Tue 5/22/2007 1:48 PM
To: Ferrechio, Lauren
Cc: Beaton, Roderick J; Ring, Heinz J.; Ellsworth, Michael W.; Bueno, Karen; Parzych, Eva; Patriarca,
Mary Louise; Germain, Kelly; Rock, Thomas
Subject: RE: Using Fog in the Little Theatre

Lauren,

ok as long as the proper protocols are followed. I will copy supervisors and dispatchers so they are
aware.

Chief

From: Ferrechio, Lauren
Sent: Monday, May 21, 2007 4:40 PM
To: Martunas, Cheryl A
Subject: Using Fog in the Little Theatre

Hello Chief Martunas,
As I think Eva may have mentioned today, I am part of an IQP group working to improve stage lighting for the
Little Theatre. As part of that, we would like to take pictures of different lights and designs that we hang in the
Little Theatre. Pictures of these designs are more visible with some haze in the air, which is why we were
asking to use the fog machine and switch the fire alarms in the theatre into bypass mode for a few hours each
day. We are planning to be finished by the end of this week. So Tuesday through Sunday from 2-6pm. We will
follow the same protocols as in a show of calling the dispatcher when we are switching in and out of bypass
mode. The amount of haze we are using will not inhibit visibility of exit signs or anything of that sort, it's just
to make the beams of light more visible. There will at most be six of us working in the theatre at once. If you

have any questions, you can call me at 978-580-1072, I have a meeting 12-2pm tomorrow, but otherwise I am available.
Thanks,
Lauren

Appendix N

Log of Individual Hours

		Richard Pavis
		Log of hours
5/14/2007	6	initial meeting, theatre cleaning
5/15/2007	5	AdvisorMeeting, inventory
5/16/2007	8	Project, Advisor meeting, project proposal, inventory, FV Rehersal
5/17/2007	7	Advisor meeting project proposal, inventory
5/18/2007	5	project proposal, cleaning, inventory
5/19/2007	2	Project proposal
5/20/2007	5	Project Proposal, FV Rehersal
5/21/2007	10	final work on Project Proposal
5/22/2007	7	Advisor Meeting
5/23/2007	6	Additonal Project proposal editing, FV Rehersal
5/24/2007	8	Advisor meeting cosultation with Paul Messier
5/25/2007	7	Base Plot, create and hang
5/27/2007	6	*French Vanilla* design, create and hang, FV Rehersal
5/28/2007	4	French Vanilla design, continue work
5/29/2007	6	Advisor meeting, *French Vanilla* cues programmed
5/30/2007	4	French Vanilla, cue and design tweaking
5/31/2007	8	Advisor meeting, Base plot tweaking, Inventory finalized, FV Rehersal
6/3/2007	9	French Vanilla, set work, FV Rehersal
6/4/2007	7	Cleaning, painting the Little Theatre
6/5/2007	7	*French Vanilla* Preview performance
6/6/2007	5	Handbook and IQP writing continues
6/7/2007	8	FV in NY
6/8/2007	24	FV in NY
6/9/2007	12	FV in NY
6/11/2007	2	IQP Portfolio preparation
6/12/2007	7	Portfolio work
6/13/2007	7	Portfolio work
6/14/2007	7	Advisor meeting Portfolio work
6/15/2007	9	Portfolio work
6/16/2007	12	IQP Portfolio editing
6/17/2007	18	Advisor meeting IQP Portfolio editing
6/18/2007	8	IQP Portfolio editing
6/19/2007	9	IQP Portfolio editing
6/20/2007	12	IQP Portfolio editing
6/21/2007	5	IQP Portfolio editing
Total	272	

Lauren Ferrechio's Hours

Date	Hours	Description
14-May	6	first meeting with Susan and Dean, start research
15-May	7	helped with inventory, planned overall project goals, labelled and organized cables
16-May	3	team meeting, reading at home
17-May	9	second meeting with Susan and Dean, project proposal, and recheck inventory
18-May	8	rechecking inventory, proposal work, assist measuring theatre for model
19-May	3	finishing reading, typing bibliography
20-May	11	compile and finish the project proposal, FV rehearsal
21-May	11	hanging some lights, pictures, finishing and submitting the project proposal
22-May	9	meeting with Susan and Dean, using haze in theatre, fire alarm
23-May	10	pictures of instruments, using the board, hanging lights, talking with police about fire alarm situation, French Vanilla rehearsal.
24-May	9	meeting with Off. Dylewicz and Capt. Beaton about LT alarms, meeting with Paul, hanging base set
25-May	8	finish base hang, starting Little Theatre French Vanilla design, typing up fire alarm protocol
26-May	4	Loading pictures to computer, captioning photos and starting handbook
27-May	9	draw and hang FV, focus front lights, FV rehearsal
28-May	10	finished focusing and gelling plot, scanning plots and typing gel and channel sheet.
29-May	10	Susan and Dean in the Little, showed designs
30-May	9	
31-May	10	finished up fire alarm protocol
1-Jun	6	taking video of our designs and informal stuff
2-Jun	4	working on video
3-Jun	10	added cues for LT French Vanilla show, cleaned up theatre, put up set for rehearsal, FV rehearsal
4-Jun	12	fixed cues, finished cleaning, fixed set, painted floor
5-Jun	7	Setting up set again, preview performance

6-Jun	4	Strike and organizing the theatre again, fixing all the house work lights
7-Jun	7	New York
8-Jun	24	New York
9-Jun	15	New York
10-Jun	5	
11-Jun	4	Writing Fog Explanation
12-Jun	9	meeting with Susan and Dean, writing light directions, organizing all the writing stuff
13-Jun	9	writing colors, fog, roles, plots, charts
14-Jun	11	Writing and editing the IQP
15-Jun	10	Writing and editing the IQP
16-Jun	9	Writing and editing the IQP
17-Jun	10	Writing and editing the IQP
18-Jun	9	Writing and editing the IQP
19-Jun	18	Writing and editing the IQP
20-Jun	17	Writing and editing the IQP
21-Jun	16	Finishing the IQP
22-Jun	5	Finishing and turning in IQP
Total	367	

Log Of Hours - Victoria Zukas		
Date	Hours	Explanation
5/14/2007	6	Meeting with Advisors, Taking down all equipment in the grid
5/15/2007	6	Meeting with Advisors, Inventorying the LT, Typing up the inventory
5/16/2007	8	Meeting with Advisors, Inventorying the LT, Working on the Project Proposal
5/17/2007	8	Meeting with Advisors, Working on the Inventory and Project Proposal
5/18/2007	6	Working on the Inventory and Project Proposal
5/19/2007	4	Working on the Inventory, Table of Contents, and Project Proposal
5/20/2007	5	Working on the Project Proposal
5/21/2007	10	Finishing up the Project Proposal and Table of Contents
5/22/2007	7	Meeting with Advisors, Taking pictures for the Handbook
5/23/2007	6	Editing Project Proposal
5/24/2007	8	Meeting with Advisors, Talking with Paul
5/25/2007	7	Create and hang Base Plot
5/27/2007	6	Create and hang *French Vanilla* design. *French Vanilla* rehearsal
5/28/2007	4	Working on *French Vanilla* design
5/29/2007	8	Meeting with Advisors, creating cues for *French Vanilla*
5/30/2007	4	*French Vanilla* rehearsal, Fixing cues for *French Vanilla*
5/31/2007	8	Meeting with Advisors, Finding homes for equipment, Last touches on base plot
6/1/2007	3	Painting the shelf and filming
6/3/2007	9	Writing for the Handbook, *French Vanilla* rehearsal
6/4/2007	3	Painting the Little Theatre
6/5/2007	7	Preview Performance of *French Vanilla*
6/6/2007	5	Writing for Handbook and IQP
6/7/2007	8	*French Vanilla* in New York
6/8/2007	24	*French Vanilla* in New York
6/9/2007	12	*French Vanilla* in New York
6/12/2007	8	Working on the Handbook
6/13/2007	8	Working on the Handbook
6/14/2007	5	Meeting with Advisors, Writing for the Handbook
6/16/2007	10	Writing for the Final Draft of the IQP
6/17/2007	13	Writing for and Assembling Final Draft of IQP
6/18/2007	4	Assembling Final Draft of IQP
6/19/2007	12	Editing Final Draft of the IQP
6/20/2007	7	Editing Final Draft of the IQP
6/21/2007	10	Editing the Final IQP
Total Hours:	259	

Chris Kingsley - Log of Hours		
Date	**Hours**	**Explanation**
5/14/2007	6	First meeting, Clearing out the grid
5/15/2007	7	Advisor Meeting, inventory, Research
5/16/2007	10	Advisor meeting, Working on Project Proposal and Inventory, *French Vanilla* Rehearsal, Research
5/17/2007	9	Advisor Meeting, Work on Project Proposal, Inventory, and Research
5/18/2007	7	Work on Project Proposal and Inventory, Cleaning, Research
5/19/2007	7	Work on Project Proposal and CAD
5/20/2007	5	Project Proposal, FV Rehearsal
5/21/2007	10	Final work on Project Proposal
5/22/2007	7	Advisor Meeting
5/23/2007	6	Additional Project proposal editing, *French Vanilla* Rehearsal
5/24/2007	8	Advisor meeting consultation with Paul Messier
5/25/2007	7	Create and hang Base Plot
5/26/2007	10	Work on CAD model
5/27/2007	6	Create and hang *French Vanilla* design, *French Vanilla* Rehersal
5/28/2007	4	French Vanilla design, continue work
5/29/2007	6	Advisor Meeting, *French Vanilla* cues programmed
5/30/2007	4	French Vanilla, cue and design tweaking
5/31/2007	8	Advisor meeting, Base plot tweaking, Inventory finalized, *French Vanilla* Rehearsal
6/3/2007	9	French Vanilla, Work on Set, *French Vanilla* Rehearsal
6/4/2007	7	Cleaning and Painting the Little Theatre
6/5/2007	7	*French Vanilla* Preview performance
6/6/2007	5	Handbook and IQP writing continues
6/7/2007	8	*French Vanilla* in NY
6/8/2007	24	*French Vanilla* in NY
6/9/2007	12	*French Vanilla* in NY
6/11/2007	2	IQP Portfolio preparation
6/12/2007	7	Portfolio work
6/13/2007	7	Portfolio work
6/14/2007	7	Advisor meeting and Portfolio work
6/20/2007	2	Sending CAD files in LA
Total Hours	**224**	

Hours - Patrick Crowe

Light IQP hours		Details
6-May	2	First F.V. Rehearsal
7-May	1	F.V. Rehearsal
9-May	1	F.V. Rehearsal
11-May	3	Paper work
13-May	2	F.V. Rehearsal
14-May	7	first meeting with Susan and Dean, take down all the lights,
15-May	13	helped with inventory, planned overall project goals, labeled and organized cables, left for New York Production meeting
16-May	19	Production meeting in NY, trip back, Rehearsal
17-May	9	second meeting with Susan and Dean, project proposal, and recheck inventory
18-May	8	rechecking inventory, proposal work, assist measuring theatre for model
19-May	6	Lighting concepts, CAD
20-May	11	compile and finish the project proposal, FV rehearsal
21-May	11	hanging some lights, pictures, finishing and submitting the project proposal
22-May	9	meeting with Susan and Dean, using haze in theatre, fire alarm
23-May	10	pictures of instruments, using the board, hanging lights, talking with police about fire alarm situation, French Vanilla rehearsal.
24-May	9	Paul Day
25-May	8	finish base hang, starting Little Theatre French Vanilla design
26-May	9	Writing the how to lists, CAD
27-May	9	Final hanging, FV rehearsal
28-May	10	finished focusing and gelling plot, scanning plots and typing gel and channel sheet.
29-May	10	Susan and Dean in the Little, showed designs
30-May	10	Put stuff way, rehearsal
31-May	10	finished up fire alarm protocol
1-Jun	6	taking video of our designs and informal stuff
2-Jun	4	working on video

| Date	Hours	Description
3-Jun	10	added cues for LT French Vanilla show, cleaned up theatre, put up set for rehearsal, FV rehearsal
4-Jun	12	fixed cues, finished cleaning, fixed set, painted floor
5-Jun	7	Setting up set again, preview performance
6-Jun	4	Strike and organizing the theatre again, fixing all the house work lights
7-Jun	7	New York
8-Jun	24	New York
9-Jun	15	New York
10-Jun		
11-Jun	4	Writing Fog Explanation
12-Jun	9	meeting with Susan and Dean, writing light directions, organizing all the writing stuff
13-Jun	9	writing colors, fog, roles, plots, charts
14-Jun	11	Writing and editing the IQP
15-Jun	10	Writing and editing the IQP
16-Jun	9	Writing and editing the IQP
17-Jun	10	Writing and editing the IQP
18-Jun	9	Writing and editing the IQP
19-Jun	18	Writing and editing the IQP
20-Jun	17	Writing and editing the IQP
21-Jun	12	Finishing the IQP
Total	**394**	

Appendix O
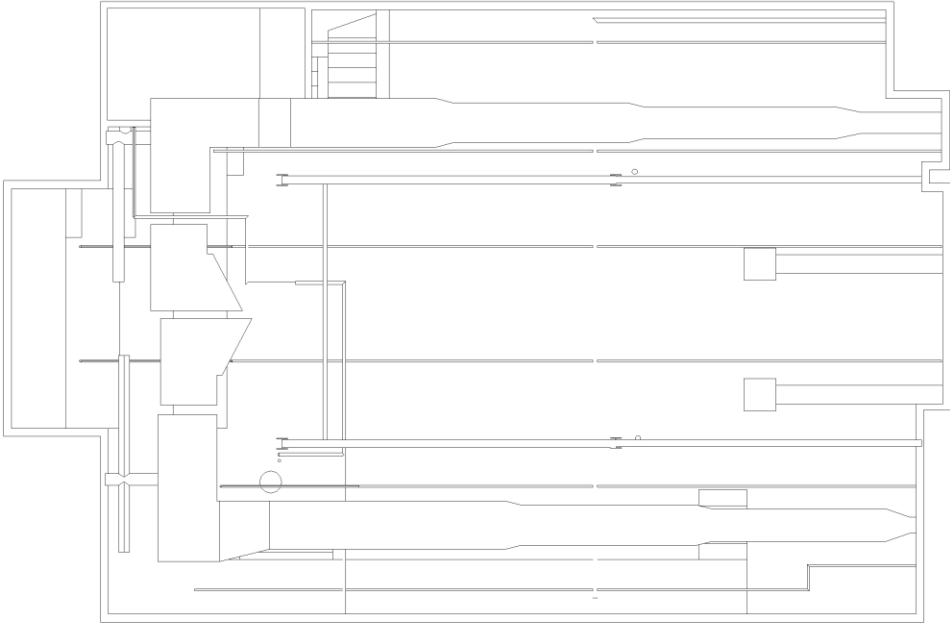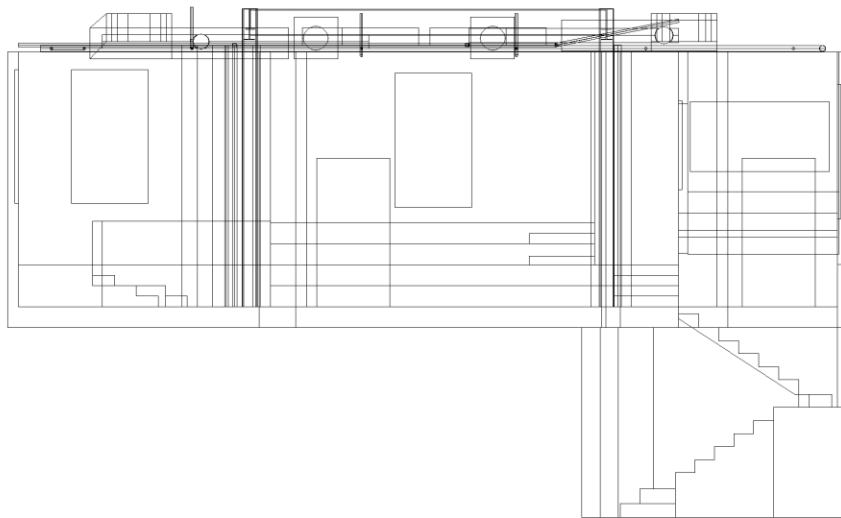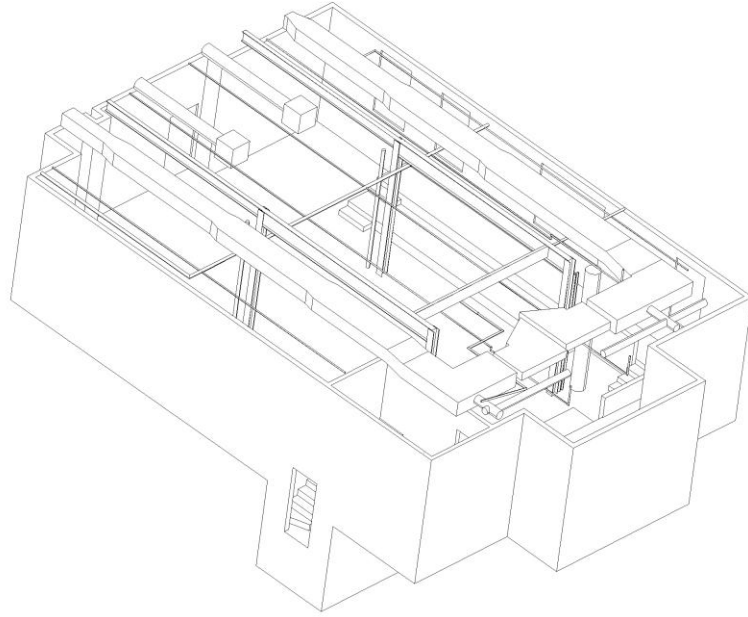

Figure 65: CAD Top

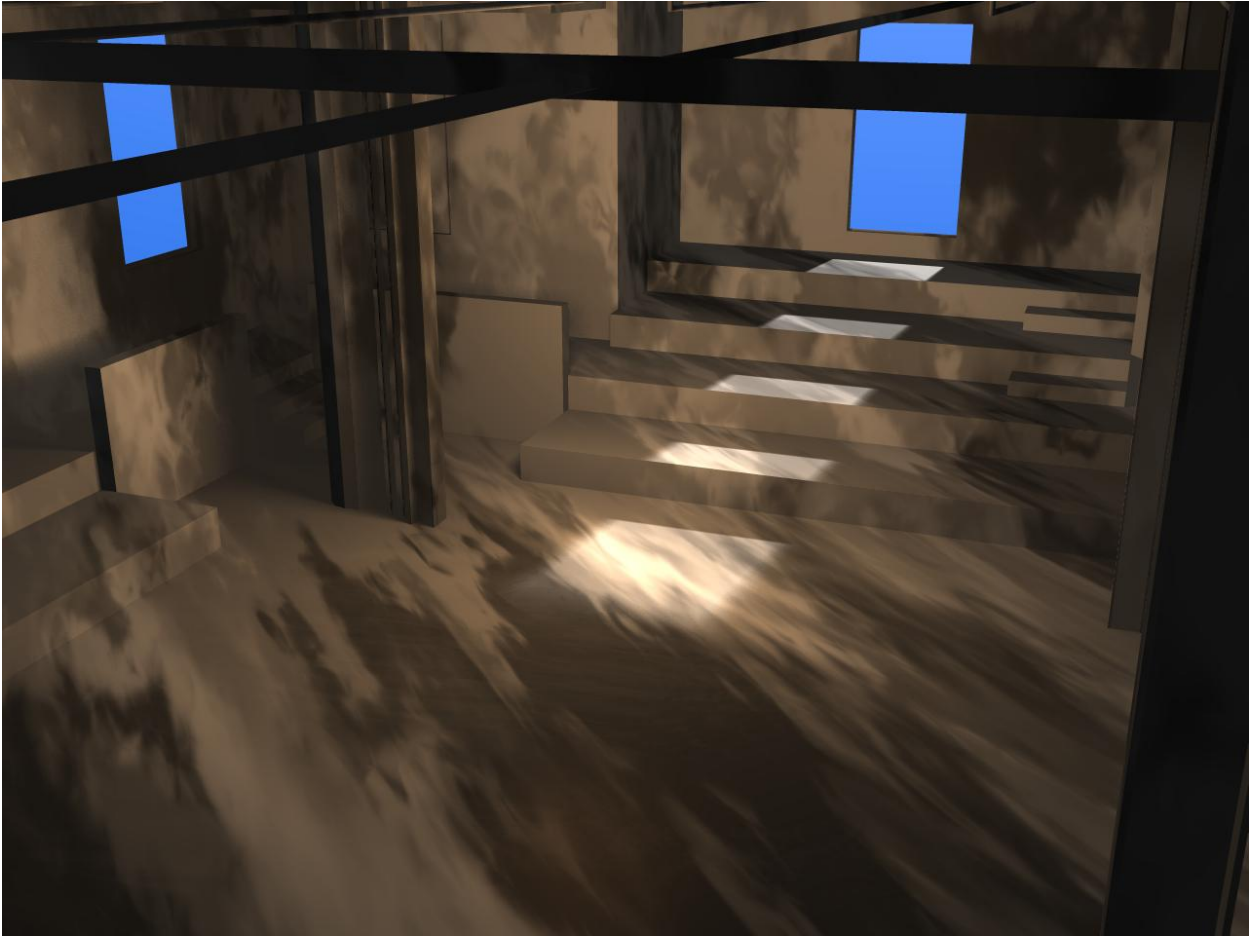*Figure 66: CAD West*

Figure 67: CAD isometric

Figure 68: completed render of the Little Theatre model

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