LIGHTING FOR DIGITAL FILM



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Lighting for Digital Film

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Summary

From basic, one-light techniques, Film Noir, and butterfly and Rembrandt to more complex setups, three- and four-point lighting, motivational lighting, lighting for weaponry, and green screens, this textbook covers the basics that you need to know about lighting on a film set over a full semester.

The first six chapters cover the history of lighting, roles and safety on set, grips, electricity, visual composition, and main lighting fixtures that students might be using. Each section is designed to be combined with hands-on practical workshops during the first few weeks of the semester. This information is the foundational knowledge for practicing specific lighting setups in chapters nine to fifteen. These later chapters cover a variety of techniques, using one key light to more advanced motivational and green screen lighting, and how to implement them successfully.

At the end of each chapter, there are interactive exercises to be performed relating to the information needed to advance to the next chapter. Many chapters also offer templates or examples, which can be found in a Resources section at the conclusion. Lastly, a glossary of lighting and on-set jargon can be found in the back matter.

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Instructor Introduction

From simple, one-light techniques—film noir, butterfly, and Rembrandt—to more complex setups, including three and four-point lighting, motivational lighting, lighting for weaponry, and green screens, this textbook covers the basics of lighting on a film set over a full semester.

The first six chapters cover the history of lighting, roles and safety on set, grips, electricity, visual composition, and main lighting fixtures that students might be using. Each section should be combined with hands-on practical workshops during the first few weeks of the semester. This information is the foundational knowledge for practicing specific lighting setups in Chapters 9-16. The latter chapters cover a variety of techniques, from using one key light to more advanced and specialized lighting, with an emphasis on how to implement them successfully.

This text, being designed to support a practical course, provides an array of ancillaries. I provide an example syllabus for a spring term. Additionally, there are pop quizzes, assignments, an example research seminar assignment, an example mid-term exam, and a glossary of lighting terms and jargon. There are also many templates for shot lists, storyboards, lighting plots, call sheets, permission forms, DOODs, rules, and policies in the appendices to provide to students. At the end of each chapter in the online book, there are various interactive flashcards, crosswords, drag and drop and fill in the blank activities to engage students, as well as suggested practical exercises for skill-building.

This introduction provides an summary of each chapter and information on any related ancillaries.

A shadowed figure running through a foggy woodland. There appears to be a light coming from a piece of headgear.

Preface: A Brief history of Lighting

Several tomes could cover the history of lighting, so this chapter serves as an outline of major players from prehistoric times to the present day. From the sun, (which we still use today), oil lamps, gas, electrical, and modern LEDs, the student will gain knowledge on all the major sources of light. At the end of the preface are twenty interactive dialog cards for students to access to help them remember several key moments in the history of lighting.

Preface Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
“Art by Firelight?” by Needham, et al.	00_Preface	PDF	Source

A shirtless man staring forward. Fog surrounds him. A rope horizontally crossing the bottom of the image behind him.

Chapter 1: Lighting Roles and Responsibilities

This gives an overview of some of the key personnel on set, from above-the-line upper administration to below-the-line production assistants. There is also an outline of the usual postproduction workflow and the roles of vision and sound editors during this stage. Although a class of students will not be able to fill all the positions on a set, they will have a good idea of what the main players do, especially when it relates to safely lighting a set. A highlighted resource, Teaching Intimacy Coordination in the Media Classroom, demonstrates best practices for filming intimate scenes on a set. At the end of the chapter is an interactive drag and drop exercise.

Black-and-white stage with the shadowed silhouette of a man standing, centered in the image and possibly wearing an unclear fancy outfit with a fedora. He cups one hand inches near his face and bends the other arm and hand outwards, but with the palm facing up and inwards, toward him.

Chapter 1 also introduces students to breaking down the script, conducting location surveys, and using a clapperboard. Presentations for all these topics are provided both in the text for students to peruse, and as downloadable and editable instructor

resources. Leading safety meetings and navigating the world of teamwork are similarly emphasized, and I've included templates for safety checklists and group work guidelines.

At this early stage in the course, I ask each student to select a topic and date for a Research Presentation Seminar. The instructions, a list of instruments to be chosen for research, and the rubric are included in the Appendices of the book and linked to below.

Chapter 1 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Rules for Dismissal	01_Lighting Roles & Responsibilities	PDF(opens in new tab)	
Movie Budget Template	01_Lighting Roles & Responsibilities	Google Doc (this link will prompt you to make a copy)(opens in new tab)	Google Doc (view only)(opens in new tab)
Introducing Intimacy Coordination to the Media Classroom Guide	01_Lighting Roles & Responsibilities	PDF(opens in new tab)	Source(opens in new tab)
Breaking Down the Script PPT	01_Lighting Roles & Responsibilities	Google Slides (this link will prompt you to make a copy)(opens in new tab)	Google Slide (view)
How to Slate PPT	01_Lighting Roles & Responsibilities	Google Slides (this link will prompt you to make a copy)(opens in new tab)	Google Slide (view)

A spiral notepad with "safety" written on it on a blank surface. The marker, without its top, is shown, and so are glasses and another item.

Chapter 2: Safety on Set (SOS)

This chapter outlines how everyone is responsible for safety on a set and the measures to be taken to prevent accidents. Also covered are the roles of the 1st AD, safety meetings, and important safety and risk assessments using the three-step SOS process. Other preventative measures include the correct clothing, weather conditions, fire, electrocution, improper handling of equipment, and common injuries. For fun and as an assessment for gauging students' safety knowledge, there is a crossword and true/false interactive activity at the end of the chapter.

This chapter has three associated presentations: Filmmaking SOS, Safety Meetings, and Preventing Production Accidents.

Chapter 2 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Filmmaking SOS PPT	02_Safety on Set	Google Slides (this link will prompt you to make a copy)(opens in new tab)	Google Slide (view only)
Preventing Production Accidents PPT	02_Safety on Set	Google Slides (this link will prompt you to make a copy)(opens in new tab)	Google Slide (view only)
Safety Meetings PPT	02_Safety on Set	Google Slides (this link will prompt you to make a copy)(opens in new tab)	Google Slide (view only)
Lightning Safety Bulletin	02_Safety on Set	PDF(opens in new tab)	
Fog & Haze Safety Bulletin	02_Safety on Set	PDF(opens in new tab)	
Risk Assessment Template	02_Safety on Set	Google Doc (this link will prompt you to make a copy)(opens in new tab)	Google Doc (view only)(opens in new tab)

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Safety Checklist Template	02_Safety on Set	Google Doc (this link will prompt you to make a copy)(opens in new tab)	Google Doc (view only)(opens in new tab)
Safety Awareness Bulletin	02_Safety on Set	PDF(opens in new tab)	
Safety Committee for the Motion Picture and Television Industry	02_Safety on Set	www.csatf.org	
CSATF General Code of Safe Practices	02_Safety on Set	www.csatf.org	
The Industry Wide Labor Management Safety Committee bulletin # 8	02_Safety on Set	www.csatf.org	

Lots of light-colored squiggles in a couple of shades set against a mostly-blank background which is darker on one side, vertically.

Chapter 3: Electricity

This chapter will not make students certified electricians, but rather it aims to teach students about electrical wiring and establishing load calculations using the West Virginia formula, and ensure they are safely using lights to prevent electrocution, even in foreign locations. At the end of the chapter is a short exercise to review the different variations of hot, ground, and neutral wires.

Chapter 3 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Electricity Group Exercise	03_Electricity	Chapter 3 Exercise in text	

Chapter 4: Lighting and Visual Composition

A painting, in-progress. Fingers holding a paintbrush add strokes to part of the piece.

The lighting crew significantly influences a film's aesthetics and style. They collaborate with the DOP and Director to enhance visual composition. This chapter covers the functions of light, compositional rules, and the use of deep focus, shallow depth of field, and rack focus. At the end of the chapter, students analyze eight images and answer questions designed to test their understanding of composition and shot sizes. There is also an interactive flashcard exercise that allows students to review terminology and concepts covered in the chapter.

This chapter has several associated presentations that can be used for review and reinforcement of key concepts: Video System and Standards, which also reviews key vocabulary, CCD and CMOS Image Sensors, and Luma and Chroma Color sampling.

After completing this chapter, students should be able to complete their first individual assignment, the **Individual Composition Review**. I've provided the assignment instructions and rubric, which students can use to evaluate their understanding of composition, shot sizes, and visual storytelling principles.

Chapter 4 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Ursa Mini Cheat Sheet	04_Lighting & Visual Composition	PDF(opens in new tab)	

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Video Systems and Standards + Review PPT	04_Lighting & Visual Composition	Google Slides (this link will prompt you to make a copy)	Google Slide (view only)
Cameras and Sensors: CCD and CMOS PPT	04_Lighting & Visual Composition	Google Slides (this link will prompt you to make a copy)	Google Slide (view only)
Luma and Chroma Color Sampling PPT	04_Lighting & Visual Composition	Google Slides (this link will prompt you to make a copy)	Google Slide (view only)
Appendix F: Individual Composition Assignment	04_Lighting & Visual Composition	Appendix F	

Chapter 5: Types of Lighting instruments

A spotlight-level light afore an unclear, blurred light background. There seem to be other, smaller spotlights and a plant in the background. This chapter discusses the various lighting instruments used in film sets, including tungsten, tungsten-halogen, LEDs, and HMIs. It also covers open-faced, PAR, and lensed instruments, different configurations, pros and cons, and diagrams of lighting instruments. It excludes xenon, metal-halide, and HEP technologies. The main types of light bulbs used today are tungsten, tungsten-halogen, LEDs, fluorescent, and HMIs. At the end of this chapter is an interactive exercise in naming in the eight different Fresnel lamp components. There is also a fill-in-the-blanks exercise that covers elements in this chapter to review their knowledge.

Chapter 6: Controlling Light and Lighting Accessories

A woman wearing a face mask one wears when people are sick. She is standing staring forward and below and in front of her is a film camera. The camera reads "RED", as in the company. The background is blurred, but there seems to be large filming equipment in it. The sky is dark and no details can be seen. This chapter covers light control, including the exposure triangle, apertures, ISO, shutter speeds, angles, lens filters, functions, contrast ratios, high-key and low-key lighting, and light metering. It also covers the use of various lighting accessories, such as black wrap, cookies, barn doors, and other staple tools to control where light falls in a shot. Flags and diffusers (e.g., silks and scrims) are found in Chapter 7, Exterior Lighting, Day and Night. Throughout the chapter are various exercises for students to critically analyze. Additionally, there are interactive dialog cards that can aid in the memorization of key concepts.

Presentations covering Camera Exposure, Depth and Lenses, and Filters for Cinematography accompany this chapter, as well as a practical exercise on exposure elements and full quiz with an answer keys provided.

At this point of the semester I give a practical midterm exam, Satan's Set**,** which is designed to assess students' safety awareness, around seven weeks into a full term. I've provided a description of the set up, the introduction and sample worksheets.

Chapter 6 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Camera Exposure PPT	06_Controlling Light and Light Accessories	Google Slides (this link will prompt you to make a copy)	Google Slides (view only)
Depth and Lenses PPT	06_Controlling Light and Light Accessories	Google Slides (this link will prompt you to make a copy)	Google Slides (view only)
Filters for Cinematography PPT	06_Controlling Light and Light Accessories	Google Slides (this link will prompt you to make a copy)	Google Slides (view only)

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Chapter 6 f/stop exercise	06_Controlling Light and Light Accessories	Chapter 6 f/stop exercise in text	Answer key located in Appendix N (password-protected; email ost@geneseo.edu for access).
Appendix E: Midterm Practical Exam: Satan's Set	06_Controlling Light and Light Accessories	Appendix E: Midterm Practical Exam: Satan's Set	
Appendix F: Satan's Set Scenario & Instructions	06_Controlling Light and Light Accessories	Appendix F: Satan's Set Scenario & Instructions	

Chapter 7: Exterior Lighting Day and Night

A lakeside with a small lighthouse sort of building in the mid-background and an anchor statue in the foreground. The anchor's handle and chain link are the parts stood upright, while the anchor part is connected to a statue base on the ground. There is a path, and there is snow. There are benches and a grill in the mid-background. In the background, there is a lake, and there are also houses. This chapter explores the importance of how and when to use the tools for natural lighting in outdoor locations. Focusing on techniques using diffusion, reflection, and flags to control the sun's power, it also covers day-for-night shooting. Mastering these skills for outdoor lighting easily transfers to controlling interior lighting. There are also some tips for filming different skin tones.

To review a student's knowledge from the Preface to this point in the semester, I have provided a fifty question cumulative quiz and answer key.

Chapter 7 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Appendix L: Cumulative Quiz	07_Exterior Lighting Day and Night	Appendix L(opens in new tab)	
Appendix K: Chapter 7 Camera and Lighting Quiz	07_Exterior Lighting: Day and Night	Appendix K(opens in new tab)	Answer key located in Appendix N (password-protected; email ost@geneseo.edu for access).

Chapter 8: Lighting plots and Recces

Diagram illustrating three-point lighting, showing a subject positioned between a key light, fill light, and back light, with a camera placed in front of the subject and arrows indicating light direction.

This chapter explains the value of lighting plots in preproduction and production, which helps lighting crews and gaffers envision lighting schemes on location. The need for location practice shots and light plots is emphasized. A fill-in-the-blank words exercise at the end of the chapter also gives students an opportunity to review the chapter content.

Templates for drawing up lighting diagrams are included along with a presentation on how to scout a location ahead of filming (recce). Helpful weblinks, such as New York State film offices, permits, and site location libraries, are included. At the end of the chapter is a practical exercise for students to practice these skills.

Chapter 8 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Basic Light Plot Template	08_Lighting Plots & Recces	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
The Recce PPT	08_Lighting Plots & Recces, 01_Lighting Roles & Responsibilities,	Google Slides (this link will prompt you to make a copy)	Google Slide (view)
Lighting Plot Example	08_Lighting Plots & Recces	PDF	
Chapter 8 Lighting Plots and Recces Exercise	08_Lighting Plots & Recces	Chapter 8 Exercise in text	

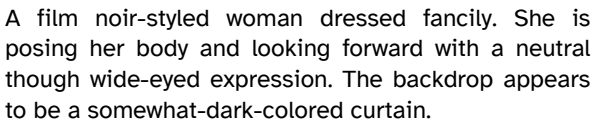
Chapter 9: Film Noir & Production Case Study

Two men pointing guns. One is looking forward and has a serious expression on his face, and the other is looking off and looks concerned or worried. This chapter explores the lighting technique in film noir, focusing on German Expressionism's geometric, dark, filmic canvases. It also outlines information for students to create detailed production notebooks for their films, providing a presentation on the topic as well as templates for most sections. An exercise at the end of the chapter asks students to analyze film noir shots and to assemble a production notebook that relate to the shots supplied. This allows them to practice their organizational skills for filming a simple film noir shot. In addition, there is a crossword activity to test students' knowledge of film noir lighting.

Chapter 9 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Production Notebook Layout Example PPT	09_Film Noir & Production Case Study	Google Slides (this link will prompt you to make a copy)	Google Doc (view only)
Film Noir Light Plot	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Location Agreement Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
DOODs Cheat Sheet	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Extended Call Sheet Template	09_Film Noir & Production Case Study	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
General Crew Release Form Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
General Cast Release Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Production Call Sheet Template	09_Film Noir & Production Case Study	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
Simple Shot List Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Simple Call Sheet Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Storyboard Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
DOOD template	09_Film Noir & Production Case Study	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Chapter 9 Film Noir & Production Case Study Exercise	09_Film Noir & Production Case Study	Chapter 9 Exercise in text	



A film noir-styled woman dressed fancily. She is posing her body and looking forward with a neutral though wide-eyed expression. The backdrop appears to be a somewhat-dark-colored curtain.

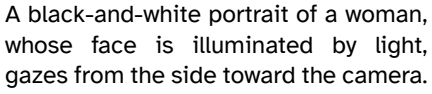
Chapter 10: Paramount/Butterfly Lighting

This chapter discusses the Paramount lighting technique, a signature style for German actress Marlene Dietrich, and its use in contemporary photography and movies. It covers the placement of light, variations, and talent movement's impact on mood and tension. The chapter includes links to a lighting plot and stills to analyze. A lighting plot and stills that exemplify this technique are contained in the chapter.

This chapter provides a lighting plot template for this technique and an interactive set of flashcards to test students' understanding. I also have students begin to think about the assignment that will be started after completing the next chapter and do a related practice exercise.

Chapter 10 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Butterfly Lighting Plot	10_Butterfly / Paramount Lighting	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Chapter 10 Low Light Exercise	10_Butterfly / Paramount Lighting	Chapter 10 Low Light Exercise in text	



A black-and-white portrait of a woman, whose face is illuminated by light, gazes from the side toward the camera.

Chapter 11: Rembrandt Lighting

The Rembrandt technique, a popular lighting style since the early 1900s, creates dramatic, yet natural-looking images. This technique requires one key light and sometimes a reflector, emulating Rembrandt's chiaroscuro paintings. The evolution of this style in film and its creation are explored, with an example lighting plot and an exercise for students to practice. There is also a multiple-choice activity to test students' understanding of this technique.

On completing this chapter, students should now be able to the Low Lighting Assignment. The instructions and rubric are found in the Appendix G.

Chapter 11 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Rembrandt Lighting Plot	11_Rebrandt Lighting	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Chapter 11 Plot & implement the Rembrandt technique exercise	11_Rebrandt Lighting	Chapter 11 Exercise in text	
Appendix G: Chapter 11 Low Lighting Assignment & Rubric	11_Rebrandt Lighting	Appendix G	

Chapter 12: Three-Point Lighting

A man standing with his body to the side from the camera who is gazing down at something blurred in the foreground. He appears to be in a room. He is wearing a light-colored button-up.

The basic three-point lighting method (three lights: key, fill, and back) to illuminate subjects within a filmic frame is discussed in this chapter. Mastering the information and skills in Chapters 2-11 is crucial before trying out three-point and four-point lighting techniques. The chapter outlines an orderly process for setting each light fixture. There are three short exercises and a fourth longer one at the end of the chapter. Dialog cards are provided for students to practice set jargon.

Ideally, students should start preparing for the group assignment/practical exam, From Script to Screen at this time. Appendix H provides the instructions and a rubric, and the peer evaluation form I use for any group work is in Appendix J.

Chapter 12 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Chapter 12 Three Point Lighting Exercises	12_Three Point Lighting	Chapter 12 Exercises in text	
Appendix H: Group Assignment: From Script to Screen	12_Three Point Lighting	Appendix H	
Appendix J: Student Peer Evaluation Sheet	12_Three Point Lighting	Appendix J	

Chapter 13: Motivational Lighting

What looks like a bunker or safe and a high-security cabinet, or a couple of them, to the side, with a clear hallway space in front of them. A man in a high-level-looking suit walks down the hallway space with a salute and holding his hat or helmet in his hand to his side. Two men wearing the same professional-looking getup as each other stand along the hallway by the safe and cabinet. The first of these men seems like he is lowering his salute and has not turned, as the moving man has already passed him. The second man is saluting the man walking down the hallway, facing to the side of the hallway as the walking man passes, and so he is able to look at him for a moment. There is a fence on the side of the hallway closer to the camera. The walking saluting man is going to enter what appears to be a more tightly-enclosed space.

Motivational lighting is an extremely important technique for creating believable, realistic images. It involves incorporating light sources such as the sun, table lamps, neon signs, streetlights, etc., to create contrast and depth in a shot. This chapter shows students how to pay attention to details such as color temperature matching and the use of practical light sources to justify their light sources inside the filmic frame and ensure the audience believes the characters and story. At the end of the chapter are several exercises for students to create cinematic images that show compelling stories, and an interactive fill-in-the-blank exercise for students to check their knowledge.

Chapter 13 Ancillary

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Chapter 13 Motivational Lighting Exercises	13_Motivational Lighting	Chapter 13 Exercises in text	

Chapter 14: Lighting for Weaponry

A man holding a gun holds the bars of the jail cell before him. This chapter discusses lighting several types of weapons for emotional effect in films. If you can light guns and knives, the principles apply to other types of weapons, whether they are cannons, cutlasses, swords, or rocks. It also includes exercises for students to conduct and practice

their own versions in the studio. There is also an interactive quiz for students to test their safety on set with weaponry lighting.

Chapter 14 Ancillaries

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Firearm Safety	14_Lighting for Weaponry	PDF	
Piercing Props Safety & Data Sheet	14_Lighting for Weaponry	PDF	
Chapter 14 Lighting Weaponry Exercises	14_Lighting for Weaponry	Chapter 14 Exercises in text	

Chapter 15: Green Screen

A room with a green screen and a table covered in green screen cloth. There are studio lights above. A high-quality film camera sitting on a pole on a box and surrounded by a glass case faces the green screen space and table. There is an opening to the side that leads to a room with giant windows on the side, some of which are lightly covered by drop-down "curtains." These windows continue over into the green screen area, just above it, above the studio lights that are within the ceiling area with no ceiling. There is a drop-down sign with many sentences' aka. two paragraphs' worth of words in German on it.

Green screen is a crucial technique in the film industry, where a subject or object is filmed against a monochromatic color. Postproduction relies on chroma keying, replacing the color with a different image or video, so proper lighting is essential to avoid headaches and costs. This chapter covers light sources, placement, and what to avoid in order to achieve the best green screen for your editor. There is an interactive fill-in-the-blanks activity to conclude the chapter, a simple exercise, and a reference sheet for black shading (though this may not be applicable if you are using different equipment). Lastly, there is a quiz for students to complete in the last week of term.

Chapter 15 Ancillary

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Chapter 15 Green Screen Exercises	15_Green Screens	Chapter 15 Exercises in text	
RED Scarlet XDragon Black Balance Instructions	15_Green Screens	PDF	
Appendix L: Final Cumulative Quiz	15_Green Screens	Appendix L	Answer key located in Appendix N (password-protected; email ost@geneseo.edu for access).

It is impossible to cover everything about lighting for digital film in a short 15-16 week term. However, this book covers the basics so that over a semester, students should have acquired knowledge and lighting skills to create images with depth, character, and verisimilitude.

However, it should be emphasized that the best way to hone skills is to continue to practice and experiment for homework and well past the end of the term. Indeed, lighting is a lifelong learning process where new ideas, fixtures, and technology will continue to evolve.

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Review Statement

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A Brief History of Lighting

Although the sun has been used as a key light (and we still do), other lighting methods evolved in tandem with human civilization. Four hundred thousand years ago, an extinct hominin, Peking Man, used fire to cook and illuminate his cave, and archeologists found ash accumulation in one part of his cave 20 feet thick.[1] This chapter fleshes out the often dangerous history of lighting instruments, from sunlight, torchlight, and oil lamps to toxic, eyeball-searing arc lamps, scorching tungsten halogens, and present-day HMIs and LEDs.

Sunlight

The sun is our giver of life and death. It can provide vitamin D for healthy bones, improve our mood, and help our immune system. In contrast, excessive sun exposure causes sunburn, contributes to skin cancer, and, if stared at by the naked eye, causes retinal damage. The sun has been worshiped as long as humankind has populated the earth—think of sun gods such as: Ra in Egypt; Inti of the Inca; Surya in Hinduism; Helios from the ancient Greeks; and Uta from the Sumerians in Mesopotamia.

An illustration of the Egyption Sun God: a human figure with a bird head.

Figure P1. Ra: Egyptian Sun God.

A statue of a Surya god from Konark, Orissa made out of clay or brown stone and rests in an arch in a wall, surrounded by other designs

Figure P2. Surya: Hindu Sun God, National Museum, New Delhi

A gate of the Sun in stone with repetitive carvings of kneeling people all facing a larger, much more protruding carving of the god

Figure P3. Inti: Inca Sun God, Gate of the Sun, Tiahuanaco, Bolivia

A carving of the sun god, Helios, the sun around his head and behind are four horses rearing

Figure P4. Helios: Ancient Greek Sun God, Berlin, Germany

Ancient stone relief depicting a seated bearded figure with a spoked wheel symbol, surrounded by smaller standing figures and cuneiform script.

Figure P5. Shamash also known as Utu: Sumerian Sun God Tablet.

Evidence of using the sun to light stages dates to the ancient Greeks and continues today when we use the sun as our key light. To ensure this natural light illuminated their actors, rather than the audience, Hellenistic outdoor theaters were strategically built east to west, and playhouses had no roofs to take full advantage of the sun's rays. Although at the mercy of the sun's position in the sky, they also used mirrors to reflect the rays, giving some semblance of control over the light.

A campfire surrounded by darkness

Figure P6. Campfire

Firelight

Paleolithic humans seem to have utilized firelight not just for its warmth, light, and cooking but also for effect. Researchers from the University of York and Durham University focused on 55 limestone plaquettes from an archeological site in Montastruc, Southern France. Using 3D models and VR software, they investigated the interplay of cave paintings and the use of firelight to deduce, "The interaction of engraved stone and roving firelight made engraved forms appear dynamic and alive."[2] You can see more information on this in "**Art by Firelight?"**. Their findings can reinforce the idea of humans sitting around the central fire not only for heat but to bring stories to life. When the theater moved indoors, flame-based light sources evolved into torches, lanterns,

and oil lamps.

A spouted shell bowl. A bowl carved into a shell or into a shell-like design.

Figure P7. Sumerian Shell Oil Lamp, Drawing.

Oil Lamps

From the 27th to 20th century BCE, the Sumerians worshiped the sun god Uta (aka Shamash) in ancient Mesopotamia, now modern-day Iraq. This civilization also used oil lamps for illumination. Often, they were simple seashells with olive oil, vegetable oil, or animal fats as fuel, but these lamps were a symbol of humans' ability to conquer the darkness.

These humble vessels evolved into metal or ceramic containers until a 16th-century Italian architect, Sebastiano Serlio (1475-1554), who loved theater design,[3] suggested using candles for illuminating the actors.

A portrait of Sebastiano Serlio. He looks to the side and carries an open book.

Figure P8. Sebastiano Serlio.

These candles were made of tallow or animal fat. He also designed basic red, blue, and yellow light filters: glasses were filled with liquid that he named bozze (Italian for 'proofs'), which the candlelight shone through. These colors depended on the liquid contents: red wine produced red, saffron became yellow, and ammonium chloride in a copper vessel yielded blue. Stage workers would monitor the candles to light them or snuff them out as needed. These filters set the mood for a scene and were an early form of special effects. This idea quickly spread worldwide and evolved into chandeliers filled with candles to light the stage.

Serlio also identified the three important qualities of lighting: distribution, intensity, and color. In this way, he became the first recorded author to credit light as an important part of the art of theater. From 1537 to 1575 he published seven books about architecture. These *Complete Works on Architecture and Perspective (Tutte L'opere d'architettura, et prospetiva.)*[4] presented several practical, classical Greco-Roman designs that could be copied and thus had an enormous influence throughout Europe. In the second book, Serlio describes three lighting characteristics: general chandelier light for the audience and actors; scenery illumination; and dramatic lighting that could change in accordance with the action. He also has a lighting plot which gives technical details regarding the layout:◈ "Adorned with innumerable lights, large, ◈medium, and small," and "a great part of the lights in the center, hanging over the scene."[5] Figure P9 shows the cover of the third book. *Il Terzo Libro was* published in 1544.[6]

An architectural book titled IL TERZO LIBRO. The pictures both represent Greek and Roman kinds of designs

Figure P9. Il Terzo Libro by Francesco Marcolini published 1544.

Since Serlio's idea took hold, candles have still been used for illumination. In the 18th century a commentator, Jacques-François Blondel, described the Parisian theater, Salle des Machines, as "among the most magnificent in Europe."[7] The playhouse contained "a row of chandeliers along the front of the stage.[8] In figure P10 you can see the lights above the audience shining down on the actors in this artwork by Pierre Gabriel Berthault, 1795.

An illustration of people in a large room.

Figure P10. Salle des Machines, Bibliothèque nationale de France, Paris, France.

In modern times, candlelight was used in Stanley Kubrick's *Barry Lyndon* (1975)[9] and necessitated the need for an extremely fast lens. Kubrick used the Zeiss lens, designed by NASA for photographing the dark side of the moon with an f/stop of 0.7, for his candlelight scenes, bringing the feeling of 18th-century authenticity to the screen.[10]

Depending on what fats were used in the candle-making process, illumination in an enclosed theater could be a very smoky and foul-smelling affair. In addition, the need for constant monitoring and the ever-present danger of fire were major disadvantages to this method of stage lighting. For example, on December 26, 1811, the Richmond Theatre in Virginia burned down with dozens of deaths.

When the curtain fell on the first act and before it rose on the second, this chandelier was lifted from its position among the scenery above. It was fixed with two wicks; only one of them had been lit; yet when it was lifted above, this fatal lamp was not extinguished.[11]

The resulting Committee of Investigation determined that the improper use of a central candle chandelier started the fatal fire, and poor emergency exits hindered the audience's safe exit.

Gas Lamps

Oil lamps were used until the gas lamp was invented in 1792 by a Scotsman, William Murdoch. He used coal gas and lit his home and offices in Cornwall, England.[12] More than thirty years later, Goldsworthy Gurney experimented with the effects of an oxyhydrogen blowpipe and a lime cylinder that shone a brilliant white light—and so the limelight was born. Gurney wrote later that

> The light from lime is not unlike daylight. I am confident that one of our largest theatres might be lighted by it with the most splendid effect.[13]

Another Scotsman, Thomas Drummond, was inspired by Gurney's work and developed a torch that burned calcium oxide (lime), giving off white light. This Drummond (or Calcium) light was adopted for survey use and aided military mapping, lighthouses, and finally the Victorian stage. The first time it was used for a performance was an outdoor juggling act in 1836 and a year later Covent Garden's theatre's stage was illuminated by the limelight.[14] As it grew in popularity it powered "the magic lanterns and the theaters of Victorian England.[15]

A diagram of a limelight. A long cylinder, which is calcium oxide, rests on a small table of sorts, on a spinning panel held in place by a tightening item, and the calcium oxide is heated by fire. The item producing the fire is connected to wires, one of which leads to a ball containing oxygen and the other of which leads to a ball containing hydrogen, both balls having pumps on them. Attached to the table also is a long skinny screw ending in a bigger screw top, labeled as a "screw for rotating and raising the calcium oxide." There is another tightening item on this side further away from the calcium oxide, set between the wires and near, but seemingly behind, the long part of the screw.

Figure P11. Diagram of Limelight.

A portrait of Sir Humphry Davy. He looks off and looks fairly happy, and wears a fancy historical outfit.

Figure P12. Sir Humphry Davy

Electric Lamps

Experimentation with electric lamps existed throughout the 19th century, and this era was filled with rivalry, failures, and successes. The inventor of the miner's safety lamp, Sir Humphry Davy, passed a current through a platinum strip that created light in 1801. However, the heated strip did not survive long. Eight years later, at the London Royal Institute, Davy demonstrated the first carbon arc lamp by connecting two wires to a battery and attaching a charcoal strip between the other ends of the wires. Unfortunately, it required too much current and was too bright for commercial production.

In 1841, Frederick de Moleyns was granted a patent for using platinum wires encasing powdered charcoal for incandescence. However, commercial development could not be undertaken until the invention of a mercury pump vacuum tube and carbon filament bulb. These were developed simultaneously by Englishman Joseph Swan in 1878 and Thomas Edison a year later.

A man wearing a suit and bowtie gazing with a thoughtful expression at a lightbulb.

Figure P13. Thomas Edison.

After several years of patent litigation, Swan and Edison merged to form The Edison and Swan United Electric Light Company Limited.[16]

Figure P14. Swan's original Newcastle carbon rod electric lamp, 1878.

Figure P15. Edison's bamboo carbon filament incandescent lamps, 1881-1882 type.

Figure P16. Jablochkoff's candle.

Figure P17. Thomas Edison's patent

There were many other inventors trying to find efficient illumination, including William Sawyer and Albon Man. However, prior to Swan and Edison's inventions, a Russian engineer, Pavel Nikolayevich Yablochkov, developed his Yablochkov Candle in 1875. His arc lamp used two carbon rods to extend the battery and could illuminate for up to 90 minutes. At the Paris World Fair in 1878, dozens of these Yablochkov (aka Jablochkoff) candles were installed on the Avenue de l'Opéra, Place du Théâtre Français, and Place de l'Opéra.[17] A year earlier, the "Avenue de l'Opéra was inaugurated on September 19, and that evening, the façade of Garnier's Opéra was illuminated by Jablochkoff carbon arc lights."[18] The lamp's popularity grew, and by 1882, thousands were installed in the affluent Parisian neighborhoods, and Paris soon became known as the city of lights.

These carbon arcs influenced the work of Swan and Edison, who improved Yablochkov's creation by developing a filament from bamboo that could last for many hours before needing to be replaced.[19] Edison's cheaper, longer-lasting, and more practical incandescent bulb improved Yablochkov's designs. In addition, he worked on conduits that used the existing gas technology as well as the Edison screw, the socket fitting that we still use today.[20]

By the late 19th century, many inventors were trying new filament elements, such as osmium and tantalum, to increase electrical efficacy. Exploring the use of tungsten, William Coolidge at General Electric's research lab successfully developed a process that could bend this brittle metal, and GE began selling tungsten lamps in 1910.[21]

Lighting for Film Production

At the birth of commercial film, filmmakers used lighting reminiscent of the theaters of ancient times: natural daylight and roofless sets. A major reason for American film production moving to the foothills of the Santa Monica Mountains and Beverly Hills in California was because of the mild climate and an abundance of sunshine. For interiors, filmmakers used the intense, white light of the carbon arc lamps, but these arc lights caused excessive eye irritation, resulting in a condition called Klieg eyes.[22] Stories of temporary vision loss were common, and the danger of retinal damage was real, as highlighted by the American physicist, Louis Bell, in 1902:

> The very great intrinsic brilliancy of the ordinary incandescent lamp is particularly noteworthy and, from the oculist's standpoint, menacing...[and] in one case reported a strong side light from an unshaded incandescent lamp set up an inflammation that resulted in the loss of an eye.[23]

Figure P18. Klieg Bros.

The development of tungsten lighting did not initially help cinematographers since orthochromatic film stock was blind to GE's red spectrum lights, i.e., even tinges of red would be completely black when the film was developed. Fortunately, as technology improved, panchromatic film stock (i.e., sensitive to all visible light wavelengths) ushered in the use of tungsten illumination. In 1929, Universal's musical, *Broadway,*[24] was the "first film lit entirely with tungsten."[25]

Tilted sideways and upwards, coming from the bottom-left corner of the image, a bulb casing and a lightbulb itself. The lightbulb is lit up, encasing the bulb casing and surrounding area in light. However, the background and surrounding area is black and empty outside of the small amount of light that seeps into it from the lightbulb.

Figure P19. Tungsten bulb.

As film stocks became more sensitive to light, the use of tungsten for movie making predominated the 20th century, with HMIs (Hydrargyrum Medium Arc Iodide lighting) supplementing the lighting arsenal in the 1960s. These bright, white lights are still in use today, mimic sunlight, and require a ballast to ignite the gas. They are heavy, take some time to reach their correct temperature, and get extremely hot, necessitating experience to operate them safely.

A spotlight on a stand set against the bright blue sky.

Figure P20. HMI on stand.

The introduction of LED (Light-emitting Diode) technology was a game changer for movie lighting. Not only do these lights weigh less and last longer, but they do not get hot, lessening the risk of fire. Nick Holonyak, Jr. was a founding father of the first practical, visible-spectrum LED in 1962. Whilst working at General Electric, he invented a laser diode that emitted visible red light, which was the precursor to the LED. They are now used worldwide in household light bulbs, device displays, and lasers.

Many LED bulbs of various shapes and sizes, all resting on a black surface.

Figure P21. LED bulbs.

In 2005, Holonyak spoke about his life and, in particular, showed the interviewer his original collection of work, including the first LED:

> But all the light is being made by this one LED. In other words, we are now in the world of high brightness and various improvements and on and on and on.[26]

A diagram of an LED device. A square with different color bars represents the diode: the bottom bar labeled anode, the next substrate, then n-layer, active region, and the top p-layer. Two terminal pins surround the diode and topped with a cathode.

Figure P22. Interior LED.

In the interest of brevity, there are many inventors and inventions not mentioned in this chapter. Students who are interested in delving deeper into this area can read a plethora of books that are solely dedicated to the history of lighting; many are in this book's bibliography.

Preface Review

These flash cards review key points in this brief history of lighting.

Interactive Content

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CHAPTERS

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Chapter 1: Lighting Roles and Responsibilities

"Strip the silks from the broads." —Cecil B. DeMille[1]

"Stripping the silks" does not denote some hideous action; it is movie industry speak for removing diffusing material (silk or gauze) from a type of light fixture (broad). A complete compendium of terms used in the film industry would fill an entire book, so this chapter gives an overview of some of the key personnel on set. In the lighting department, the director of photography, gaffer, best boy, and sparks are the main personnel for lighting a set safely and in keeping with the director's vision for color, mood, and tone in a movie. This chapter outlines each of their roles, responsibilities, and who they report to. In addition, other key players, such as the director and producer, are also outlined in this chapter. It should be noted that some of these roles and responsibilities overlap depending on the film's budget (especially low-budget or student films).

As there are so many roles and personnel involved in the film industry, this chapter only covers the main personnel that would be used on a small production of around twenty students. The faculty member serves as the executive producer.

Torsos of people standing wearing historical militaristic gear, and one is playing the drums.

Figure 1.1. Military precision.

Film production, akin to military precision, has a hierarchical structure and chain of command. High-end budget films have thousands of crew members, whilst a student production might only have a dozen crew members or even less. Below is a diagram for a higher-end production. Lower-budget films might double up or eliminate some positions entirely.

On a budget sheet, the costs are arranged into "above the line" and "below the line" financials. Every line on the budget related to cast and crew, and every other item paid for (e.g., locations, permits, costumes, props, make-up, food, transportation, accommodation, etc.) are variable costs and considered "below the line." Fixed costs are called "above the line," and pertain to the executive producer, producer, cinematographer, writer, and major cast, and they are usually given a fixed salary that would not change.

A diagram titled "Above the Line." The top box says "Producers: -Executive Producer. -Producer." There is a vertical line leading to the box next-down. It says "Director." Three lines extend vertically off of this second box. They say, from left to right: "Director of Photography," "Main Cast," and "Writer."

Figure 1.2. Above the line.

Everything else "below the line" has costs that change, usually on a daily basis. The charts above and below are not intended to show every single position on a set, especially high-end ones, but include the basics that would be needed for a student-run production. You can use this as a jumping-off point for your productions, adding roles according to the class numbers and what is available to them.

A diagram titled "Below the Line." The box the rest of the boxes extend from says "Director." The other boxes say, from top to bottom, left to right: "Editor. Composer. Sound Sweetener," "Sets," "Casting," "Sound: - Recordist. - Boom Operator," "Location Department," "Camera Department: - Camera Operator. - 1st AC. - 2nd AC/Clapper," "Lighting Department: - Gaffer. - Best Boy. - Sparks. - Key Grip. - Grip," "Assistant Directors: - 1st AD. - 2nd AD," and "Production Manager."

Figure 1.3. Below the line.

Executive Producer (EP)

The executive producer (EP) is usually responsible for the financing of a production and is subsequently in charge. They can often be the rulers of all things, and their decision is final.

A long table with lots of people sitting at it.

Figure 1.4. EP word is sometimes law.

However, this is not always the case. I have been on productions where all the EPs are investors who have given lesser amounts of money to production and have no desire to oversee anything. The prestige of having one's name as an EP in the credits is often a glamorous appeal to folks and the reward for donating some money. I worked on a set where the director wanted his girlfriend to be part of the production and would not work if she was not part of it. The producer made her an EP with a strict demand: she could only watch the filming. On a student production, EP and producer can overlap.

Producer

Critical in the preproduction phase, the producer handles the financial and organizational aspects of a production and approves expenditure. Sometimes the responsibilities of EP and producers can overlap due to their versatility and skills at negotiation, troubleshooting, and fundraising. Often in collaboration with the EP, they usually pick and secure the rights to a script, and hire the director, creative personnel, cast, and crew. They have control over logistics and resources and are key to ensuring production runs smoothly. The producer also often acts as the mediator between departments and must make tough decisions. In general, there are two main types of producers: those who are hands-on and affect the look of the film, e.g., Jerry Bruckheimer (*The Rock*),[2] and those who are never seen but felt, e.g., Michael Douglas (*One Flew Over the Cuckoo's Nest*),[3] whose father, Kirk Douglas, gave him the rights to the film.[4]

Two actors sit at a table, with a director holding a script leaning in to speak to them.

Figure 1.5. Director.

Director

Here are just a few influential directors over the decades: DW Griffith; Georges Méliès; Akira Kurosawa; Alfred Hitchcock; Steven Spielberg; Werner Herzog; and Pedro Almodóvar. However, not to be forgotten are female directors such as: Alice Guy-Blaché; Dorothy Arzner; Nora Ephron; Jane Campion; and Kathryn Bigelow. The director is primarily responsible for overseeing the shooting and editing phases of film production and is often involved at various stages of pre-production.

Two people in old-timey garb sitting facing each other, looking into each other's eyes and smiling.

Figure 1.6. Dorothy Arzner with Clara Bow during filming *The Wild Party*, 1929.

Directorial style is as varied as acting styles, with some directors known to be difficult taskmasters and others easygoing creatives. In 1995, as a young filmmaker, I was lucky enough to interview Scottish Director, Bill Forsyth (*Gregory's Girl*,[5] *Local Hero*[6]). He was involved in a cultural endeavor to encourage children's interest in filmmaking in Kippen, a small village in Scotland. Forsyth told me he was involved in every aspect of a film but felt actors were to be given respect and gentle guidance. He was extremely gracious, and after the interview was complete, he helped me put away my equipment. Scottish actor Bill Paterson, who played a main character in Forsyth's *Comfort and Joy*[7] said, "He was a lovely director and never had any difficulty talking through what he had in mind."[8]

Directors should have the final say, but they have a delicate balancing act in bringing their vision to the screen, on time and on budget, whilst keeping their bosses happy, i.e., executive producers and producers. Sometimes a director is also a producer and juggles technical and creative work with financial roles. Students who wish to take on this challenging role should be aware that directing films is not an easy job.

Several people on a stage juggling bats between them.

Figure 1.7. Juggling.

The ability to communicate ideas and their overall vision to everyone is essential. I have seen students who become egotistical, ignore useful input from others, and treat others with disdain. Recently, I had a student director who did not acknowledge the main actor whatsoever until they were on set, and even then, it was a cursory, but loud, "action." This is not an effective way to behave off set, let alone on set. I took this student aside and communicated this to him. Balancing collaboration with the cast and crew, getting the job done efficiently, and handling problems professionally is challenging for even the most experienced filmmaker.

Close up

Directors dealing with intimate shots often do not take this seriously enough and have the potential to put actors in uncomfortable situations, whether for a student production or a high-end movie. I was a consultant for Edit Media's OER ***Intimacy in the Classroom*** guidelines, which I use with my students regularly. I recommend students follow these guidelines, so they have a strong grasp of fairness, equity, and sensitivity in the industry.

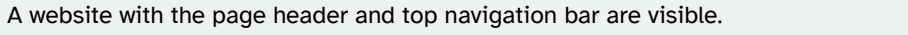


Figure 1.8. Edit Media, ***Intimacy Coordination in the Media Classroom***

Troubleshooting technical and creative issues can often be easier than handling tricky situations with personnel. It is helpful to have written documentation of rules and policies for working on set to reference if such situations do arise. For example, I rely on these **Rules for Dismissal** (also available in the Student Resources section at the end of the chapter). This document has been invaluable for major problems caused by some personnel and is a mini version of real-life situations on a set. Only once in twenty years of teaching has a student been fired from a production. They humbly had to ask another group to join them.

First Assistant Director (1st AD)

In addition to assisting the director, the 1st AD has an especially significant role in scheduling and communicating with the crew, constantly checking that the cast and crew are in the correct place and on time. They create detailed daily schedules in collaboration with the producer, director, and heads of departments, and oversee the daily call sheets. Additionally, and most importantly, they oversee the safety of everyone on set. Please see further details in Chapter 2 Safety on Set, and the safety checklist in this chapter's Student Resources to use/amend accordingly.

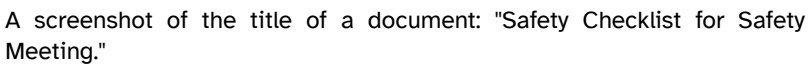


Figure 1.9. Safety Checklist.

The main organizational tools and documents the 1st AD uses are call sheets, schedules, and a Day Out Of Days (DOODs) (see links to examples and templates in the Student Resources section at the end of the chapter). The DOODs involve the arduous task of breaking down the script into elements such as scenes, locations, actors, special effects etc., to fit this gigantic puzzle into an efficient schedule. The 1st AD also works closely with the key grip (see key grip later in this chapter). It should be noted that the 1st AD does not help with choosing shots or directing actors.

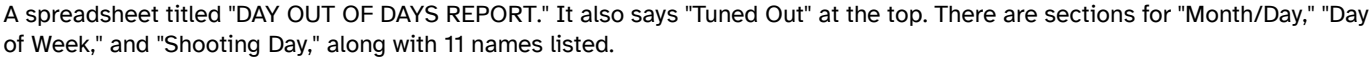


Figure 1.10. Snapshot example of a Day Out Of Days (DOODs)

Close up

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Second Assistant Director (2nd AD)

The 2nd AD is important if there is a large cast or a plethora of extras. Once the schedule has been drawn up, this person must ensure the cast knows the logistics of when they are needed, the location, and how to get there ahead of time. Often, they might have to cast and secure extras, particularly for crowd scenes. Large productions might have more than one 2nd AD so that you would have, for example, one prepping the actors before they go onto the set, whilst another oversees the immediate filming. In addition to working with the director, they work closely with the production manager or coordinator regarding transportation and accommodation. Sometimes, they create daily call sheets from the production schedule, in cooperation with the production manager or coordinator. The "second" also liaises with actors, putting the cast through make-up and wardrobe. Sometimes the 2nd AD feels like the image below when everyone needs help!

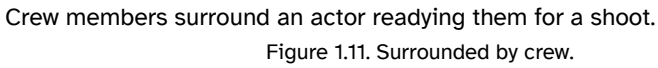


Figure 1.11. Surrounded by crew.

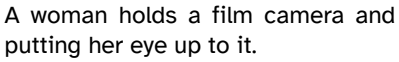


Figure 1.12. The author as cinematographer checking out the image through the diopter cup, also known as the viewfinder.

Cinematographer/Director of Photography (DOP)

The acronym DOP or DP is used for the director of photography and is synonymous with cinematographer. They do not handle the camera as the camera operator has that role, but they check the images before taking the shot (see camera operator section). However, sometimes, particularly for lower-budget films, the roles are carried out by the same person. The cinematographer helps the director visualize the script and design the story's aesthetic regarding camera angles and lighting design. They are experts on photographic processes, lighting, choosing lenses, format, composition, and how to manipulate the camera for each shot. In consultation with the director, they ensure the style of each shot suits the director's vision and determine which moving shots and rigs are best used to create mood, tone, and character. The DOP also works closely with the gaffer and the camera operator.

I had the pleasure of attending a discussion held with the English cinematographer, Roger Deakins, at the National Association of Broadcasters in Las Vegas, NV. I remember him saying that carefully planning every shot and communicating with his crew, including the key grip, before each day's shooting is extremely important to ensure the lighting design is implemented.

Gaffer

This term is for the head of the electrical department and oversees the crew of electricians on a film set. I come from the UK where gaffer is slang for a supervisor in a factory or team of laborers. However, the term gaffer has been used in films since the 1920s. The gaffer is responsible for the execution, and sometimes the design, of lighting plots. Sometimes the position is credited as the chief lighting technician (CLT), and they supervise the placement and rigging of the lights. Experienced gaffers can coordinate the entire job of lighting and managing resources, e.g., generators, lights, cables, and labor. They are responsible for knowing the appropriate gels to achieve a variety of effects, such as transforming midday into a beautiful sunset. Usually, the gaffer works for and reports to the director of photography. Delegated by the director of photography, and collaborating with the key grip, they implement the lighting plans.

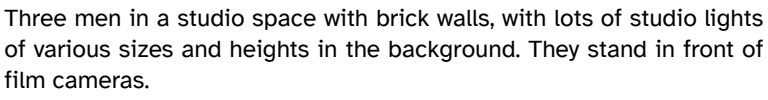


Figure 1.13. On set.

Best Boy

The best boy is the gaffer's trusted assistant in the electric department. They help the gaffer to oversee the lighting technicians (see sparks/juicers section). The origins of this are various and difficult to prove. During my undergraduate film university days, my professor said it was from the Depression era in America. Men and boys would line up outside the studios each day looking for work, and the 'best boy' picked, or in other words the strongest and most healthy-looking boy in the crowd.

two actors and two crew members on an old time movie set.

Figure 1.14. Cecil B. DeMille in 1923

As with the origin of the gaffer's moniker, the term best boy was also in use by at least 1936. Film director Cecil B. DeMille, who laid out major terms in use on a film set, reported "The best boy is the gaffer's assistant," in an article for the *Washington Times* in June 1936. [9]

The best boy is responsible for daily running of the lighting or grip department, like the hiring and scheduling of crew, ordering or returning lighting or grip equipment, workplace safety, timecards, expendables, loading production trucks, planning and implementing the lighting or rigging of locations and/or sound stages, coordinating rigging crews and additional photography units, handling relations with the other production departments, and serving as the main daily representative of the department with the unit production manager and coordinator of the film.

Sparks/Juicers

Sparks or juicers are also called electricians, though not all are professionally trained. On a set, the gaffer might say, "We need more juice," meaning, "we need more lighting power in a particular area of a shot," so the nickname for the electricians, juicer, is obvious. Similarly, the term sparks is derived from electric sparks. These roles are responsible for the movement and setup of various pieces of lighting equipment. They lay electrical cables, wire fixtures, install gels, scrims and gobos, focus the lights, and assist in creating effects or programming sequences. For a student production, I recommend each juicer to be responsible for setting and striking one to two lights each.

A wheeled vehicle on a track holding a giant film camera operated by two crew members.

Figure 1.15. Grip.

Key Grip

Sometimes, the grip is called the first company grip. The key grip oversees the equipment related to the lighting and supervises a team of grips. They have specialized skills using dollies, jibs, cranes, car mounts, and many heavy-duty equipment relating to filming on a set. Collaborating with the grip team and the 1st AD, the key grip is responsible for safety on set, especially when stunts and dangerous effects are in use, such as pyrotechnics.

A dolly track indoors. A film camera rests atop the platform. Two men are working on it.

Figure 1.16. Dolly and track with grips.

Grip

A grip reports to the key grip and is responsible for handling all the essential equipment on a film. A grip must have organizational skills, strength, and technical knowledge. After checking the schedule and design for the shots, they unpack the equipment, heave it to the locations, and set it in place as instructed. They build tracks, push dollies, hold the camera steady, and help with steadying a tripod, jib, crane, or any other rig equipment. Lifting heavy equipment and ensuring everything is in working order is a high priority so that when a director is ready to film, they can do so without any hiccups. Throughout the shoot, they must be vigilant, checking for possible malfunctions and safety, which must be brought to the attention of the key grip and 2nd AD.

As a brand-new student on a film set many years ago, I made the mistake of touching a doorway dolly (I wanted to feel the bright orange handle). The grip was none too pleased and shouted at me, saying, "You cannot touch the grips' equipment!" He frightened the life out of me.

A woman looking into a panel off of a film camera

Figure 1.17. Camera operator.

Camera Operator

Reporting to the DOP, the camera operator physically operates the camera, maintaining the composition and camera angles throughout each shot. The operator must handle a variety of technical equipment, e.g., remote-controlled electronics, cameras, cranes, and mobile mountings. They also help assemble and set up equipment during planning, preparing, and rehearsing scenes.

A grainy black-and-white photograph of a man looking down at a film camera.

Figure 1.18. Camera person.

First Assistant Cameraperson (1st AC/Focus Puller)

Following instructions from the director or DOP, the 1st AC is responsible for maintaining image sharpness on whatever subject or action is in the filmic frame. This is performed by adjusting the camera lens or pulling focus to follow the action on set. They do the same for racking focus. They also manage and maintain camera equipment, including lenses, filters, and matte boxes. The 1st AC arrives on set before the director, DOP, and camera operator to ensure the camera and required lenses are prepared for the day's shoot. If the director or DOP wants to try out a specific lens, 1st AC assembles the camera so that they can look through the eyepiece to assess the shot. At the end of the day, they must clean up and pack the camera equipment for the next day.

A person holding a clapper up to a camera.

Figure 1.19. Clapper board example.

Second Assistant Camera Person (2nd AC/Clapper Operator)

The 2nd AC, also known as the clapper operator, operates the clapperboard. The clapper identifies each of the takes for each shot and helps with continuity. This responsibility is not an easy task, as they must ensure the slate and clapper are clearly visible and in focus in each shot, executed efficiently and correctly. They work with the camera operator (who helps get the clapper into the correct place in the frame) and the focus puller (who must ensure the details are in focus). Learn more about this procedure and important jargon, such as tail slates, soft stix, and how to slate, in the close up below.

Close up

Slating/Marking

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Production Manager

The production manager must be as omnipotent as a god! Keeping track of everything is an important skill for this position because the PM organizes the general running of the shoot every day during production. As a liaison between the department heads, they try to ensure production goes smoothly. They are responsible for sticking to the budget, securing permits, ensuring union compliance, and scheduling and ensuring all equipment, catering, cast, crew, etc. are doing what they are supposed to be doing. Keeping the shoot on schedule is often an exceedingly difficult role requiring skills in negotiation, time management, troubleshooting, and leadership. Knowledge of copyright laws, health and safety, and contractual rights is particularly important.

The ability to walk on water is a bonus.

The script supervisor, while studying a binder of information, speaks to the director.

Figure 1.20. Script supervisor with director.

Script Supervisor

Also known as continuity, the script supervisor's role starts during pre-production as they create a continuity breakdown document and consult with the heads of each department. This document analyzes the script, noting cast, actions, wardrobe, props, scenes, and story days. Timing the script is also performed by the script supervisor at this stage.

During filming, the camera assistant works with continuity to check that the clapperboard information is correct. With each take, the script supervisor compiles detailed notes regarding which camera lens is used, the position of the actors, where action starts and finishes, what clothes/hair/make-up is worn, and where sets/furniture/props are placed.

Continuity works closely with the director and DOP during shooting to ensure consistency between takes, camera angle changes, and character eyelines. The script supervisor gives feedback before filming and notes vital information regarding each shot, whether it is good, bad, or unusable. These notes are used by the editor during postproduction and allow them to effectively have eyes and ears on set.

Continuity also prepares a daily report at the end of the day and updates the shooting schedule. The daily report includes how many shots, scenes, takes, and retakes were filmed. These updates are important for informing revisions to the following day's shooting schedule.

Focus!

Matching eyelines means to ensure actors look in the correct direction at the correct height of what they are supposed to be looking at, especially when looking at someone or thing out of frame. Otherwise, they will be looking at the ceiling when they should be looking at the floor.

Sound recordists wearing headphones and squatting by some cords and equipment.

Figure 1.21. Sound recordist.

Sound Recordist

Also called location sound mixers, they record synchronized sound during production and non-synchronized atmospheric sounds. The sound should be as clear and problem-free as possible, and this is difficult to do. Sound recordists report to the director.

Boom Operator

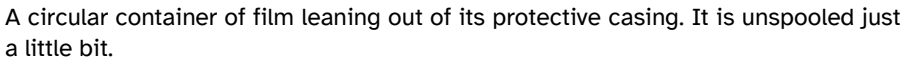
A crew member holds the rod of a large boom microphone with fluff over it above three actors speaking to each other.

Figure 1.22. Boom operator.

The person who is responsible for holding the boom pole that secures the microphone is known as the boom operator. They maintain the optimum position for capturing clear audio. Care must be taken to avoid being in the shot and that the cables remain out of the way of the cast and crew during a take. Smaller productions often have one person acting as boom operator and sound recordist, though it is preferable to separate these roles to ensure better audio quality, as trying to focus on both responsibilities can lead to less than stellar audio recordings.

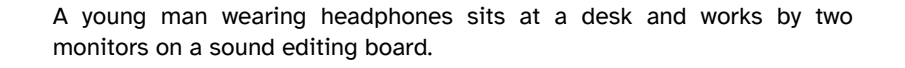
Editor

The editor works closely with the director and should be cataloging and assembling the various takes every day during shooting. They meet with the director every day to inspect the footage that has been shot (also known as dailies). Historically these are also called *rushes,* as raw footage that had just been filmed was placed in circular film cans and a runner would *rush* them over to the editing room.



A circular container of film leaning out of its protective casing. It is unspooled just a little bit.

Figure 1.23. Film stock in can.



A young man wearing headphones sits at a desk and works by two monitors on a sound editing board.

Figure 1.24. Sound editor.

Close up

Editing Workflow: Here is a typical editing workflow during postproduction:

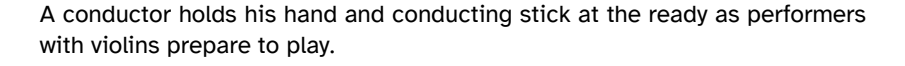
- Housekeeping: ingesting and logging all the shots, putting them into logical order inside the software, e.g., Avid, Final Cut, Adobe Premiere, etc.
- Assemble edit: shots are loosely inserted onto the timeline to gauge each scene.
- Rough cut: film is strung in sequence loose dialogue; there can be dozens of rough cuts.
- Fine cut: film is finely tuned, without music. The composer starts spotting for music.
- Picture lock: no further image cutting will be done so sound sweetening can be performed.
- SFX: special effects are created immediately after picture lock.
- Color grading and correction: once the picture is locked, the colorist will add the stylistic mood that aligns with the director's artistic vision.
- Sound sweetening: sound editor takes over perfecting audio, sound effects, and atmos.
- Music: composer delivers finished musical tracks.

Sound Editor

The sound editor builds up the soundtrack and conducts sound sweetening by removing problematic dialogue or sound (for example, pops, hisses, and breaths) and ensures amplitude levels are correct depending on what should be heard for the audience. When no further edits can be done, they perform an audio mixdown for a fully integrated audio track.

Composer

The composer looks at the fine cut of the film and decides where music is to be inserted, known as spotting for music. The composer liaises with the director, producer, editor, and sound editor.



A conductor holds his hand and conducting stick at the ready as performers with violins prepare to play.

Figure 1.25. The author's personal favorite is an Italian composer, the late Ennio Morricone.

Foley Walker

This term is named after Jack Foley, who worked in the silent film era. With the advent of sound in 1927, Foley was tasked with adding composite music and an effects track to be added to a silent film, *Showboat*, 1929,[10],[11] and so the first Foley session was born. Today, Foley walkers are sound effects specialists who create sounds to accompany the action on screen, often using creative means (such as by walking on varied materials or substances).

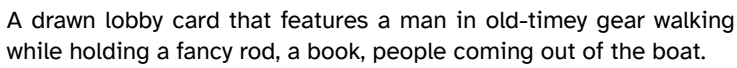


Figure 1.26. *Showboat* Lobby Card

Production Assistant

This position is more commonly known by the acronym PA, and there can be one or many production assistants on a production. They usually carry out administrative tasks and work in the production office. They help the production manager and can double up as a runner during the shoot. They also take care of obtaining the consents from extras during the shoot.

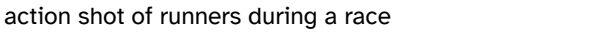


Figure 1.27. Runner Braden Collom.

Runner

Without a runner, a production can quickly fall apart. Also called a go-fer, runners help load and unload equipment, assist all other members of the crew, drive cars, and vans, and help with catering if necessary. The role requires stamina and strength and is extremely useful training. Often an entry-level position, this first step, if you do it well, can lead to more employment.

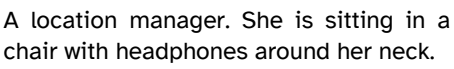


Figure 1.28. Location manager on set.

Location Manager

In charge of researching and visiting suitable locations with the director and producer, the location manager is responsible for securing permission to film in chosen locations. They must ensure (along with the production manager) that everyone knows how to get to each location, where the crew should put their belongings, park their cars, find the restrooms, set up dressing rooms, etc. The location manager is also responsible for ensuring at the end of the shoot that locations are left in the same—or better—condition as before. They should not have to clean up after everyone, but rather they ensure everyone cleans up after themselves and that the location is locked up at the end of the day.

Combining Roles

For a student production, there are often not enough people to take on all these roles. However, the following are recommended pairings:

- Producer and director
- Production manager and first assistant director
- Director of photography and camera operator
- Clapperboard operator and script supervisor
- Gaffer and best boy
- Key grip and grip
- Production assistant and runner

Sound recordists and boom operators should not double up with any other role, as clear sound is of the utmost importance. Similarly, location managers have so much responsibility and are often out scouting locations (also known as recce), so it is preferable to not have them take more than one role on set unless they have completed their work already in pre-production. Learn more about this role in the additional resource, The Recce, in Student Resources at the end of the chapter.

Chapter Review

Roles and Responsibilities Drag & Drop Activity

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

Chapter 1 Student Resources

Resource Title	Link to document	Alternate format (if applicable)
Rules for Dismissal	PDF	
Movie Budget Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Intimacy Coordination Guide	PDF	Source
Safety Checklist Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Production Call Sheet Template	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
Simple Call Sheet Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Breaking Down the Script PPT	Google Slide (view)	
How to Slate PPT	Google Slide (view)	
The Recce PPT	Google Slide (view)	

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3. *One flew over the Cuckoo's Nest*. Directed by Miloš Forman. United Artists, Warner Bros. Home Entertainment, 1975. 1.01: Lighting Roles and Responsibilities#return-footnote-26-3
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6. *Local Hero*. Directed by Bill Forsyth, Enigma Productions, Goldcrest Films International, 1983. 1.01: Lighting Roles and Responsibilities#return-footnote-26-6
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Chapter 2: Safety on Set (SOS)

Lighting is one of the most dangerous elements during film production, and cast and crew are the most precious assets on a set—people are not expendable. This chapter outlines how to implement safety protocols, prevent set accidents, and apply safety and risk assessments using a three-step process referred to as SOS: Spot the hazard, Obtain measures to control the hazard, and put Safeguards in place to minimize hazard.

This chapter covers the entire crew's responsibilities regarding safety and the specific role of the first assistant director (1st AD) in safety meetings. Improper clothing, adverse weather, fire, electrocution, improper handling of equipment, common injuries, and preventative measures are discussed. How to find and utilize safety awareness bulletins for almost any danger one can think of, such as fog and haze machines, is covered in this chapter. Safety when using weaponry on set is covered in Chapter 14, Lighting for Weaponry.

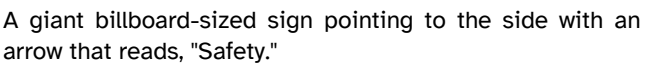


Figure 2.1. An important part of safety on set is assessing risk.

Hazard and Risk

Hazard refers to the potential for harm. Risk is the chance of that harm happening. Some hazards might seem obvious, but people still need them highlighted. Life is dangerous, but on a set, if there is a risk of 100%, then preventative measures are required for the risk to be 0%. Conducting risk assessments is particularly important and should be conducted ahead of time, as well as on each day of shooting. During these *walkthroughs,* think about what could possibly go wrong and what could be done to prevent it from occurring. Follow SOS:

- **S**pot the hazard and determine how risky it is**.**
- **O**btain measures to control the hazard and
- introduce **S**afeguards to reduce this risk.

The resources at the end of this chapter contains a simple risk assessment template that you can use.

Primarily, make sure you **have permission** to film and obtain a location permit signed by an appropriate person in authority. Please see the Location Agreement in the resources list at the end of the chapter that you can amend for your own use. If you do not have a permit, it can cause many problems.

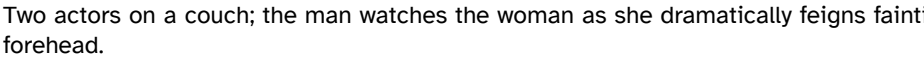


Figure 2.2. "Duh!" This is how you can feel when permission is not obtained.

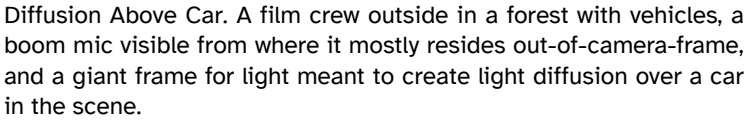


Figure 2.3. Police officer on set.

Once, near the end of term, a student called me to say his group was filming on a railway line without permission. He had refused to go with them, telling them that it was not safe and that they should refrain from doing so. This student behaved correctly, and I assured them it was the right thing to do. I was 50 miles away and deeply concerned for their safety, so I had to call our local police to inform them. The police had a tough time finding the student crew as they were not at the address given to me by the student.

The following day, I had a long discussion with the students about why they did this. They said that it was an abandoned railway line, and no one knew they were there, so they thought it was OK. They were incredulous when I said those were two more reasons for obtaining permission. What if something had happened to them? They put everyone in harm's way. The producer, production manager, director, and I could have been liable for reckless endangerment at best or involuntary manslaughter at worst.

Setting aside a designated area as the staging area before anything is set up at a location is especially important. The staging area is for keeping all equipment in the same zone and preferably away from the set itself. If a separate zone cannot be used due to location restraints, then a separate zone away from the central set should be allocated. When everyone breaks for meals, ensure there is at least one fire watcher on the set to look after the equipment and set. If you can spare a second person, that is even better. When the film crew has finished with the location and struck the set (putting all the equipment and gear away), conduct a dummy check—a final walkthrough to make sure nothing has been left behind.

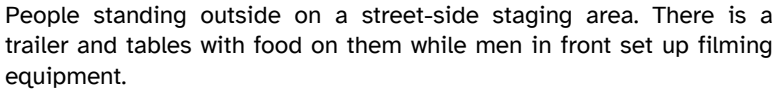

People standing outside on a street-side staging area. There is a trailer and tables with food on them while men in front set up filming equipment.

Figure 2.4. A staging area is visible in the background on this outdoor location shoot.

Set Etiquette

Set etiquette demands that everyone pays attention to each other, adheres to the chain of command, takes care of equipment correctly, and does not rush. This is efficient, saves time, and keeps everyone happy and safe. During a student production where roles are often doubled up, it is important to keep the first assistant director (1st AD) responsible for safety. Keep in mind that the key grip can have the last word on safety since they oversee rigging, stands, flags, and other equipment. Safety discussions should be conducted long before filming occurs, and, on a professional shoot, meetings are regularly held with the heads of department, stunt coordinators, pyrotechnic supervisors, animal wranglers, weaponry, props, and other crew divisions. They will identify the hazards, conduct a risk assessment, compile a safety plan, and ensure measures are taken to implement this plan. For a student production, this will be on a smaller scale, but just as important.

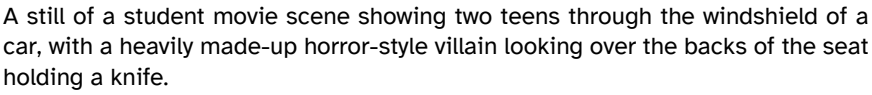

A still of a student movie scene showing two teens through the windshield of a car, with a heavily made-up horror-style villain looking over the backs of the seat holding a knife.

Figure 2.5. Set etiquette.

Safety Meetings

Safety meetings, conducted by the 1st AD, should occur each day **before** filming begins and include **all** affected cast and crew personnel. When someone arrives after the meeting, the 1st AD must review safety with them before they start work.

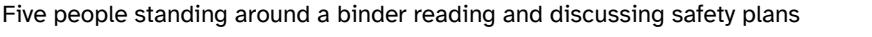

Five people standing around a binder reading and discussing safety plans

Figure 2.6. Safety meeting with four actors in the *Cold Soldiers* feature film.

A **safety meeting checklist** covers everything relating to the goals for the safety meeting:

- Communicates potential hazards to everyone.
- Establishes safe working zones.
- Ensures everyone knows their roles and who to report to.
- Discusses specific rules of the location.
- Outlines emergency procedures, such as fire alarms, extinguishers, exits, first aid, and telephone
- Outlines the evacuation plan.
- Reminders that if injury/hazards are seen, then report to first aid **immediately.**

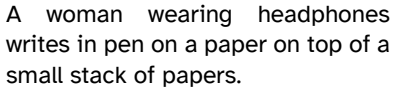

A woman wearing headphones writes in pen on a paper on top of a small stack of papers.

Figure 2.7. The 1st AD was doubling up as sound recordist on a short film. She is making notes regarding safety on the checklist.

To achieve safety goals, the safety meeting checklist should include the full contact details of location personnel, what hazards exist, the actions to be taken, and who is responsible for each item on the list. See a template safety meeting checklist in the Student Resources section at the end of the chapter.

Safe working zones, the rules of the location (e.g., no entry to a certain area in the location), and emergency procedures and evacuation plans should also be discussed. I insist all student productions bring a fire blanket and a first aid kit to their locations.

They should make a record of any risk assessment to ensure the students are clear on how to stay safe and can save time during the shoot.

In addition, safety meetings should be conducted when

- production moves to a new location,
- there is a significant change in cast and/or crew,
- stunts or special effects are scheduled or have changed,
- fatigue is a concern, or
- there are significant changes to the original plan for the day.

To complement the safety meeting, the previously distributed **c**all sheet should also include the contact details (phone number, full address) of the nearest emergency room, a “doc in the box” facility (walk-in clinic or urgent care), and a pharmacy. Although most people have GPS on their phones, a printed-out map and directions to these facilities should also be included in the production notebook for reference.

For more safety guidance, refer to the Safety Bulletins prepared by the Labor Management Safety Committee for the Motion Picture and Television Industry. These bulletins cover every conceivable hazard (e.g., firearms, fog machines, poisonous plants and reptiles, railroad safety, water hazards) and the best procedures to follow for each. I recommend they be attached to call sheets so personnel can peruse them ahead of the daily safety meetings. There are also information fact sheets, including a **general code of safe practices** that contains a succinct summary of general safety on set that **all** personnel should review on a regular basis.

Additionally, every production should have a fully stocked **first aid kit.** This kit should include:

- emergency first aid guide
- breathing barrier (with one-way valve)
- tourniquet
- adhesive bandages (assorted sizes)
- sterilize gauze pads (of diverse sizes)
- wraps, various sizes (securing bandages/wound dressings)
- absorbent compresses (assorted sizes)
- instant cold compress
- adhesive tape
- antibiotic ointment
- antiseptic wipes
- disposable gloves (non-latex)
- tweezers
- scissors
- eyewash kit for particle debris
- hydrocortisone ointment (topical for allergic reactions)
- aspirin and/or ibuprofen (pain relief and inflammation reduction)
- antacid (heartburn and indigestion relief)
- Benadryl (antihistamine for allergic reactions, will cause drowsiness).

Close up

A giant billboard-sized sign pointing to the side with an arrow that reads, "Emergency."

Figure 2.8. Stop, call, report.

Emergency Protocols

Unfortunately, even when following safety protocols and procedures, emergencies may still occur. Before I became a filmmaker, I was a Registered Nurse. I have had my full share of unexpected emergencies throughout the years, including car accidents, seizures, heart attacks (one on a plane in South Africa!), head injuries, and a drowning (small boy at a swimming pool). Hopefully you will never have to deal with any of these life-threatening events, but regardless of the type of emergency occurring on a production, **people are not replaceable,** so if something occurs that is not safe is imperative to:

- **Stop** what you are doing.
- **Call 911 immediately** for a life-threatening event.
- **Report** to the **safety officer/1st AD** as soon as possible.
- **Inform your instructor** as soon as possible.

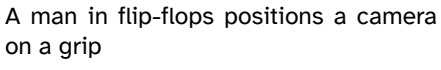


Figure 2.9. This crew member is **incorrectly dressed** for using tracking equipment; he is wearing flip flops and shorts with a baggy shirt, so the risk of injury is high.

Dressing for Safety

Wearing and bringing appropriate clothing to set is an important first step to ensure your own safety. Long hair should be tied up, jewelry should be avoided, and scarves secured. Open-toed footwear can lead to abrasions and damage by cold or hot conditions. Hard, rubber-soled, closed footwear can help prevent this along with metatarsal bruises, breaks, general foot damage, and electrocution. Heavy boots are desirable as they are durable and can give the legs and feet good support. Long trousers are best as they can prevent skin abrasions, provide coverage for hot and wintry weather, and help prevent bug bites or worse. Having multiple layers is also highly recommended, as they can be added or removed according to the weather conditions and terrain.

Invest in a pair of heavy-duty leather gloves that protect your hands from burns (**never** touch a hot light without them), jagged edges, or worse. Using blankets and hand warmers can be used for colder temperatures. A sun hat for shade or a cozy hat for chilly weather should be used. Sunglasses and/or snow goggles should be with you depending on the weather. Flash burns can occur in the snow and are very unpleasant. A waterproof coat with a hood and an umbrella is also recommended in case of rain. Whilst on location, I had a student who had severe pellebaphobia (fear of umbrellas). He had to remain in the car until the rain had passed. If conditions are going to be extreme, such as freezing or boiling, then clothing must be suitable for this type of weather.

I was a cameraperson for a documentary in Norway during November many years ago. It was below freezing with a bone-chilling wind, and we were standing on a corner for several hours after midnight. I was clad in my second-hand sheepskin coat that I had procured from an Army and Navy surplus store. It was worn by a fighter pilot in WWII (complete with oxygen piping) and kept me cozy.

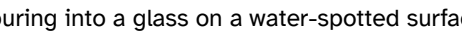


Figure 2.10. Keep cast and crew hydrated.

Bring sunscreen and water. The National Institute of Health recommends that one person needs to drink around 9-13 cups of water, for a female and a male, respectively.[1] Of course, this is only in normal situations. Strenuous work, heat, cold, and size of person also make a difference. So, err on the side of caution and drink more. In the interest of saving the planet, bring a recyclable bottle. For some student productions, funding may not be available for catering, so bringing your own water and food is important. I encourage students to allocate some of their funds to this, as a well-fed and watered crew and cast lead to a happy, more efficient production.

Sleep Deprivation

If you are feeling sleep deprived or taking any medication that can affect your ability to use equipment, notify the 1st AD immediately. The working day should be a maximum of 12 hours with 12 hours of rest. The minimum time for cast and crew to be able to sleep is ten hours (also referred to as “turnaround” time). Traveling to and from the location must be part of the working day. If there are night shoots, you must allow personnel to acclimate to working at night. Block all the night shoots together, preferably at the end of a production, and include a full 24 hours between the shift from day to night and vice versa.

I had a student who suddenly developed a pollen allergy. He took some Benadryl, which causes drowsiness and impaired cognition in many people. Within 45 minutes, the student was dozing off! Needless to say, I sent him home.

Allergies

Emergency issues can arise from allergic responses to a variety of environmental factors: bee stings, food, plants, or even perfumes. It is important, ahead of time, to make note of cast and crew allergies and take measures to prevent this. If someone cannot breathe, call **911 immediately.**

Weather & Related Injuries

A projected weather forecast can help the cast and crew prepare appropriate clothing and measures to be taken when needed.

If there are extreme conditions projected, such as thunderstorms, high winds, and snowstorms, then production should be canceled and rescheduled. Sometimes harsh weather can occur unexpectedly, especially wind, rain, and lightning. Do not wait until the drizzle becomes a rainstorm. Using radar and weather apps for real-time data can avoid major inclement weather.

Despite no clouds or rain, lightning can strike from a thunderstorm miles away. Using the **30:30 rule**, an estimation of the distance of the lightning strike can be made. You may have done this as a child for fun by spotting the lightning bolt, counting the seconds to when you hear a crack of thunder, and dividing the seconds by five, thus approximating the distance of the storm in miles. If you count to less than 30 seconds from spotting the lightning to hearing the thunder, the lightning is around six miles from your location. **You are in danger and must seek shelter immediately.** You should not return until 30 minutes have elapsed after seeing the last bolt of lightning or hearing the last thunderclap. However, you should not return until the 1st AD has given the all clear.

Hypothermia

There are five stages of this: mild, moderate, severe, apparent death, and actual death. However, it should never reach even the mild stage. Keep a lookout for anyone who is “umbling,” that is, fumbling, grumbling, mumbling, and stumbling.

Major symptoms of mild hypothermia include:

- shivering
- pale skin
- fast heart rate
- feeling sleepy
- unclear speech
- confusion
- exhaustion

This is an **emergency.** You need to **call 911 immediately.** You should also do the following:

- Do **not** attempt to warm up their arms and legs.
- Do **not** give them alcohol or cigarettes, as these hinder the rewarming process and put undue stress on the heart and lungs.
- **Gently** take them to a warmer, dry area.
- Insulate them from a cold surface.
- Remove their wet clothing.
- Cover them with blankets.
- Give them warm, sweet beverages.

You can find out more information on the Centers for Disease Control (CDC) website.[2]

A drawing of a penguin and a man wearing a Scottish flag in a cold area with an igloo and fishing hole. The penguin asks with a cheeky expression on its face, "Would you like a coat?" The man replies, "No thanks. I'm Scottish."

Figure 2.11. Penguin

Frostbite

Affecting the skin, this is more common than hypothermia, and often the signs are ignored. It is actual damage to body tissue and cells. Anywhere on the face (cheeks, nose, chin, eyelids), ears, fingers, hands, toes, and feet are most affected first. Indeed, many people do not know they have frostbite until someone notices it. At the early beginning of frostbite, the skin may look red and have some pain. This is the time to get out of the cold and warm up. If the skin looks white, grayish/yellow, unusually hard, or waxy to the touch or is numb, get to a warm place as soon as possible. Do not rub the affected area. Get to a warmer area immediately, be gentle, and use WARM (not hot) water on the affected areas. This is an emergency, and you need to call 911 immediately. See detailed information on the Centers for Disease Control (CDC) website.[3]

Heat Exhaustion

Heat exhaustion is preventable by scheduling shooting for cooler weather (such as early evening), wearing the appropriate clothing, hydrating with cool drinks, and taking adequate rest breaks in a cooler environment. However, when the body overheats, the risk of heat exhaustion is high, especially with a combination of strenuous activity (working on a set) in humid, hot environments. Remember you do not have to be outside for this to happen. Working inside without cooling measures is detrimental to the body.

Heat exhaustion can happen suddenly or gradually, as initially the body tries to cool down by sweating. Without cooling measures and hydration, dehydration quickly occurs. The drop in blood pressure and corresponding fast heart rate lead to dizziness, nausea, headache, muscle cramping, and fainting. If the skin feels damp but the person has goosebumps, this is a positive sign of heat exhaustion.

Take immediate action to stop what you are doing, reach a cooler area (see next paragraph), loosen your clothing, and make sure sweet, cool drinks are taken; **sip slowly and do not gulp liquids down. Symptoms should improve within an hour.** If they persist, despite treatments, or if they start vomiting, become disoriented, confused, or lose consciousness, this is an **emergency,** and you need to **call 911 immediately.** See detailed information on the Centers for Disease Control (CDC) website.[4]

Heat Stroke

This is a **medical emergency**, and you need to call 911 immediately. When the body can no longer cool down, they show the same symptoms of heat exhaustion, but the body can no longer sweat to cool down. Instead of sweating, the skin feels **hot** and **dry**. The core body temperature rises very quickly in under fifteen minutes. Vomiting, confusion, delirium, and seizures leading to coma are an immediate threat to life. Bring them to a cooler place, loosen clothing, pour cool water over the body, and if able to drink, offer sips of cool water. If available, fan the body and put ice packs to groin and armpit areas. If you have access to a cold bath, then immerse them in one immediately. However, to repeat, this is a medical emergency, and you need to call 911 immediately.

Prevention

Please also see clothing in the next section. Always provide a space for cast and crew to take shelter from the elements (hot or cold), either inside a building or an enclosed tent with cooling fans, AC, or heaters. Food and hot or cold drinks should always be available, but especially water, and lots of it.

Actors wearing historical war gear crowd under a tent on a sunny day.

Figure 2.12. This tent might have worked for shade if there were not so many using it at the same time!

I was working as a production manager for a low-budget television film. One location was at the height of summer in a sheep-filled field in the English countryside. Two days earlier, I had given a production assistant (PA) enough money to purchase the

daily food and water for the cast and crew. I had informed him to have our refreshments by the location at 8 am. We arrived at the location around 7 am, and by 9 am we were hungry and thirsty. No PA. We had no cell phones, drones, or Amazon deliveries in those days, and the nearest call box was 20 miles away. The PA eventually arrived with one small sandwich and a bottle of water!

Fire

Implement SOS before filming occurs. Ensure the evacuation plan is discussed at the safety meeting, and everyone knows where the exit doors are. Do not block any entrance or exit doors. I insist students book a fire blanket from our equipment room and always have it on set. The location of fire extinguishers should also be discussed during the safety meeting, and ensure the cast and crew know how to use them.

A fire extinguisher hanging on a wall.

Figure 2.13. Aim the extinguisher at the base of a fire.

Below are important steps to prevent fires:

- Check that all electrical equipment is in working order (e.g., do not use items with bare, bent wires).
- Ensure all cables are taped down.
- **Never** have liquids (water, coffee, etc.) on set.
- Protect equipment from moisture, especially in humid conditions.
- Do not use flammable materials on lights, e.g., paper, sticky tape, etc.
- Do not have flammable materials, e.g., silks, nets, etc., too close to a light source.
- **Never** touch a bulb with bare hands because the oil can cause the bulb to explode.
- Do not leave production lights unattended or switched on when not in use.
- Check lights regularly to ensure they are not overheating.
- Check scrims and gels between takes as they can burn.
- Do **not** remove or block smoke detectors.
- Do **not** remove, block, or hang items on the fire sprinkling systems.
- When cooking food, do not leave items on the stove unattended.

A sprinkler on a ceiling

Figure 2.14. Sprinkler

What to do in case of a fire:

- If you smell or see smoke, stop everything.
- Inform the 1st AD immediately.
- Quickly investigate the source. Sometimes it is just a little speck of dust or an insect on a light, but it could be more serious.
- **If in any doubt, call 911 immediately.**
- If it is small, throw a fire blanket over the source.
- **Call 911 immediately.**
- Do **not** throw water onto electrical fires.
- Use a fire extinguisher on flames, but do not tackle large fires.
- Evacuate immediately. Smoke inhalation from a doused fire is bad for the lungs.
- After evacuation, the 1st AD checks the call sheet to ensure no one is missing.

Common Injuries on a Film Set

Here is a list of the most common injuries and can be avoided with correct measures to reduce the risk of injury:

- tripping hazards (cables, wiring, and ropes on sets)
- falling equipment/props
- electrocution
- vehicle crashes: particularly in the use of helicopters for filming sequences
- injuries from pyrotechnic effects, including explosives and incendiary devices
- insufficient and/or non-existent safety equipment on set

Although it may seem like common sense, often rushing to finish on time is when hazards are missed or people start taking risks. If this starts to happen, it is the 1st AD's responsibility to take a moment to calm everyone down and remind them: this is only a film. If you feel pressured, try to lighten the workload. Ask yourself, can I cut out some shots or setups to give me the time to get the most essential stuff for the film without panic? Alternatively, can I return the following day to complete the shots?

My students have not used helicopters (yet) on any shoot, but when I was a production manager for a professional production, a famous, tipsy cast member turned up, and I had to cancel the helicopter shot immediately. This was costly and a waste of time as we had to readjust our schedule. My producer was not happy but knew that safety was paramount.

Tripping

Wires and cables should be taped down correctly with gaffer tape, including any cables that cross walkways. Try to run cables as close as possible to the walls. Students should be shown how to do this for efficiency and safety. Lighting should be secured correctly with correct mounting pins and sandbags. Dangling wires should be secured with gaffer tape. Items should not be strewn haphazardly around the set and keep equipment on a level surface to prevent them from falling over. Try to have it organized by department, having a place for everything, and keep it in a handy, secure area nearby. Doorways, including fire exits, should **not** be blocked, ever! Allow for a few feet of space for people to always be able to easily pass each other. These are your fire lanes. Never block doorways or exits with gear and always create several feet of space for paths of mobility through your set. Do not mishandle equipment. Fingers can get jammed into equipment boxes. Dumping hot lights into kits can cause the wires to melt or even start a fire!

Lifting

Be extremely careful when moving/lifting heavy or dangerous things. This includes props and furniture. Bend the knees when lifting to prevent a slipped disc. Instead of lifting, push items if it is safe to do so. Have someone else help you or use appropriate lifting equipment, but make sure you know how to use the lifting equipment first!

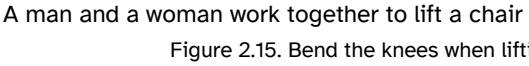

A man and a woman work together to lift a chair

Figure 2.15. Bend the knees when lifting.

When you are carrying equipment, warn cast and crew members that you are coming. Clearly and loudly, call out "points coming through!" or "points!" If you cannot remember this, just use "watch out!"

Never bring food and liquids onto a set. Eat and drink during breaks in an area away from the set. **Never** leave liquid containers open, nor put food and liquids onto equipment or equipment carts.

Camera Risks

Never leave a camera unattended (or any other equipment for that matter). These can be very heavy, so having a helping hand is important. If you are transporting the camera on set, use "cam on the move!" or "moving cam!" Utilizing a sandbag on a flat spreader can stop the camera from inadvertently tipping over. For walking shots, ensure the camera operator and cast members are comfortable with the route and that there are no obstacles in the way. If the camera operator needs to walk backwards, there should be an assistant (spotter or an assistant camera person) to guide them, and practicing this first is important. If a shot is up high or near the edge of something, extreme caution needs to be taken. Does the shot have to be taken from a precarious position? Can you do it somewhere safer? Also take into consideration how your position might appear to passersby–a crew member partially hidden or in a precarious position could lead to a police callout.

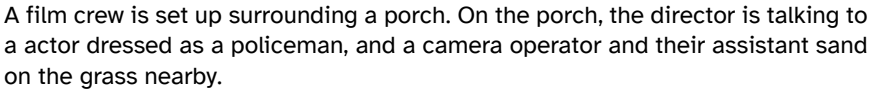

A film crew is set up surrounding a porch. On the porch, the director is talking to a actor dressed as a policeman, and a camera operator and their assistant sand on the grass nearby.

Figure 2.16. You can see the assistant camera person on your left about to help the camera operator whilst the director is chatting with an actor. The boom operator is setting up placement for the mic.

A few years ago, one of my groups of senior students was filming near the harbor. They had obtained permission and had informed the local police. It was a zombie horror genre, and they had a transparent plastic bag with bloodied, dummy arms and legs. A passerby called the police in a panic, saying there had been a murder! Needless to say, the police confirmed that it was a student production; they had permission, and the limbs were fake.

Sound and Boom Operation

When performing audio work, being aware of surroundings is important. Sound operators need to collaborate with the other crew and cast for each shot. Discussing the best place to situate themselves to perform their jobs efficiently and develop plans to install microphones if boom operation is impractical. Be careful when moving the boom pole, checking overhead and around before changing pole position. If sessions are lengthy, then ear fatigue can easily set in. In general, you should consider taking a ten minute break every hour to give your ears some relief. If the boom operator must hold it for over fifteen minutes, they should remind the 1st AD they need a break.

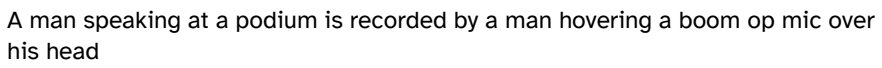


Figure 2.17. Do not hold boom in place for more than 15 mins without taking a short break.

Poor Visibility

Always inform everyone on the set when the house lights are going to be switched off (lights for visibility that are not production-related). Do the same when turning them back on. You should **never** leave the cast and crew in darkness without first informing them. If there is a corridor to be used as a passageway, make sure there is some form of lighting in place.

When filming after sundown or in dark locations, everyone should use a flashlight, headlights, or similar items for visibility. Unless there are plenty of phone chargers on hand, using cell phones for lighting is not a good idea, since cell phones are important for emergency needs.

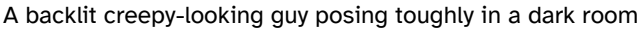


Figure 2.18. Dark set

Equipment and cables need to be very carefully set down, taped, etc., in the dark since it is too easy to trip over or lose items. Work lights should be used, even when loading and unloading. These should always be pointed down onto the work area so as not to blind people. Reflective vests should be worn for crew if they are beside traffic with their work zones signposted with road cones or hazard triangles. **Do not skip** these important safety measures.

Electrocution

All crew should wear rubber-soled footwear. The gaffer and best boy should always make an electrical plan of the location ahead of shooting. The location scout should also be in attendance, as knowing where and how to access the circuit breaker is the first step. Taking an inventory of all the electrical outlets, the possible circuits, determining how many lights will be used, and where stingers (extension cords) will be placed are all part of this electrical management plan. Always make sure the load is appropriate for the location. Use the West Virginia Formula to accurately account for wattage, voltage, and amperage for electrical load (see more in Chapter 3, Electricity). If you are outside the U.S., research the country's voltage system. For example, the UK's standard voltage is 220-230, whereas the USA is only 110 volts. Even plugging in a cell phone requires an adapter in Europe.

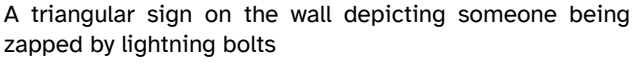


Figure 2.19. Electrocution sign

Around fifteen years ago we were on an exterior night shoot on the USS Yorktown aircraft carrier during a cold fall evening in Charleston, SC. Many hours had been spent setting up all the lights. We were about to conduct our first shot when the PA shouted out, "I am going to make coffee." Before I could shout "stop!" she had plugged in the coffee machine, and all the lights on the ship went out. Those few extra watts had tripped the breakers. Remember that other departments should use their own circuits outside of the shooting area, and they should ask the gaffer if they can use a different area first.

Never put bare fingers, water, paper, sticky tape, or similar flammable items on a light. Do not put items into a live socket, including fingers, screwdrivers, scissors, etc. Never remove a plug by yanking it out with the cable. Remove it using the plug instead. Never use a lighting instrument that shows bare and/or frayed wires. **Always switch a light off at the source, at the head, before unplugging it from the socket.** When plugging in a light, always ensure it is switched off first. **Always** use heavy-duty gloves when dealing with lights. Please also see the Chapter 3, Electricity section on safety.

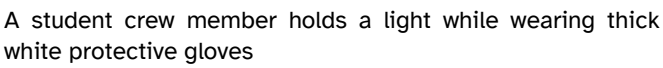

A student crew member holds a light while wearing thick white protective gloves

Figure 2.20. Wearing gloves on set

Environmental Issues

Power sources (like computers, battery chargers) and all lighting equipment should not be used near water. Be aware of puddles or similar areas that have standing water. Equipment must be as far away as possible if you are working close to water, e.g., swimming pools. The cable connections need to be elevated, covered, and run into Ground Fault Current Interrupter (GFCI) outlets. Examples of these are found in bathrooms and kitchens, and it is easy to purchase plugs or GFCI extension cords.

Filming near or on sand can be a lot of bother as it can get everywhere, even when there is no wind. Camera equipment is extremely sensitive, so ensure these items are not exposed to this type of environment for long. Cover items with trash bags, tarps, or plastic covers to protect everything as best as possible.

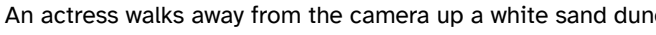

An actress walks away from the camera up a white sand dune

Figure 2.21. White sands

Tools and Specialist Equipment

When using hand or power tools, make sure you are qualified to do so, and all equipment is in proper working order with all the protective guards in place. Talk with your instructor if you are unfamiliar with the equipment, have any questions, or feel that you need additional training. Jibs, cranes, dollies, tracking, and generators are dangerous in inexperienced hands.

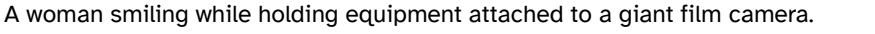

A woman smiling while holding equipment attached to a giant film camera.

Figure 2.22. Jib operator

Ladders

It is mandatory to have two crew members, the operator and the guard, when using ladders. The guard ensures that no one bumps the ladder while it is in use. It should be on a level surface, so it does not topple over, and the guard can hold it steady as an extra measure. **Never** put a ladder on top of another platform, such as a table. Do not put your body outside the confines of the ladder (for example, leaning over) as the danger of tipping over or falling is real. Do **not** exceed the top two steps. A ladder is only for climbing, so **never** leave items (cups, tools, etc.) on top of the ladder. Always look out for people who are above or below you. Do not use a ladder that is in disrepair.

Vehicles

No one should try to drive home if they are overtired. However, this is extremely important if you are a camera operator. Not only are you tired, but your ability to judge spatial distances is impaired from looking through a viewfinder or diopter cup all day. **Do not drive** home after a long day of filming; make sure someone can drive you home.

Several years ago, I had a friend who had been working a sixteen-hour day as a camera operator. The police stopped him on the highway, saying he was veering over the road. He admitted he had been working long hours on a set. He received a fine for reckless driving and points on his license.

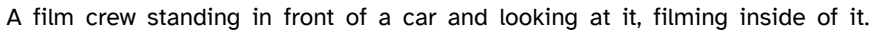

A film crew standing in front of a car and looking at it, filming inside of it. Someone also holds a boom mic toward it.

Figure 2.23. Car shot

Moving car shots should only be done if it is necessary. The director, 1st AD and location scout should procure appropriate safe driving locations and the necessary location permits. Informing the police should always be done. It is also essential for drivers to obtain the correct driving license and insurance, (particularly regarding liability and accidental coverage) pertaining to whatever state/country you are in. Ensure you are well versed on the rules for using cars for film and any additional precautions that are required. The Industry Wide Labor Management Safety Committee **bulletin # 8 is on** their website for additional guidelines.

A film crew looking at people in a car in a forest.

Figure 2.24. Car shot

Close up of a camera operator

Figure 2.25. Camera operator

Individual Responsibility & Professional Behavior

Safety on a set is paramount, and film production personnel take this very seriously. The law holds companies to a **duty of care**, but **everyone** is responsible for their own safety and that of their colleagues. If someone sees an accident waiting to happen and does nothing to try to stop it, they can be held responsible along with their supervisors.

Many men goofing off. One has his hands up with giant gloves. One presents to attack another with a long stick.

Figure 2.26. Messing around: This was taken **after** filming had wrapped.

Filming is demanding work but lots of fun too. However, having fun does not mean carelessness, rudeness, or unprofessional behavior. Never run and do not sit down. Sitting down sends a poor message. If you have nothing to do, then be on alert, watch, and learn. Do not point (remember the saying it is rude to point?). Use the correct jargon to communicate and use an open hand. **Be professional**, especially when it comes to intimate shots (review the Intimacy Coordination Guide**)** and treating each other, and yourself, with respect.

Unprofessional behavior is related to rules for dismissal (review your Rules for Dismissal). **Do not partake in alcohol or take drugs** during a production**—ever.** Alcohol promotes the risk of dehydration, leading to fatigue, confusion, and short-term memory loss. Consequently, being under the influence is detrimental to yourself and those around you. It only takes one lapse in judgment, and you or someone else can be injured or worse. This rule includes having a hangover. I worked with Sir David Frost on a program in the UK. We had a young cast member who arrived late as he had been partying all night. Despite the make-up artist's best attempts, she could not disguise his hungover complexion. His first performance was less than stellar, and he was fired.

In black-and-white, depicting a woman applying blush makeup to another woman who is wearing a fancy collar.

Figure 2.27. Make-up artist

In summary, everyone should familiarize themselves with the general codes of safety. The 1st AD and relevant heads of department should discuss hazards, conduct and record risk assessments, and conduct regular safety meetings to ensure people are clear on how to stay safe. The 1st AD should do a walk-through of each location prior to filming. Cast and crew should pay attention during the safety meetings. Everyone should listen to each other, follow the chain of command, look after equipment properly, and avoid rushing. If you see something hazardous, make sure you report it to the 1st AD immediately. If everyone on a set is on constant alert for hazards and follows the measures to prevent risks, then time will be saved with a happy and safe cast and crew.

Chapter Review

Crossword Puzzle

Interactive Content

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True-False Quiz

Interactive Content

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Chapter 2 Student Resources

Resource Title	Link to resource	Alternate format
Lightning Safety	PDF	
Fog & Haze Safety Bulletin	PDF	
Risk Assessment Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Safety Checklist Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Safety Awareness Bulletin	PDF	
Location Agreement Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Simple Call Sheet Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Rules for Dismissal	PDF	
Intimacy Coordination Guide	PDF	Source
Safety Committee for the Motion Picture and Television Industry	www.csatf.org	
CSATF General Code of Safe Practices	www.csatf.org	
The Industry Wide Labor Management Safety Committee bulletin # 8	www.csatf.org	

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4. CDC. “Symptoms of Heat-Related Illnesses.” Extreme Heat, 15 May 2024, https://www.cdc.gov/heat-health/about/index.html. Accessed 22 May 2026. 1.02: Safety on Set (SOS)#return-footnote-694-4

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Chapter 3: Electricity

Electrocution is a clear and present danger when working with high-wattage lights on sets. A “baby” or 1K has 1,000 watts in its housing. We are not turning students into electricians, but knowledge about wiring and how to calculate load safely is the goal of this chapter. Consequently, this section reviews electrical wiring, so students know the hot, neutral, and ground wires regardless of the color differentiation. To establish the load, using the West Virginia formula is important so students can calculate how many lights can be safely plugged into one circuit, even if they are filming in a foreign land.

At the end of the chapter is a short group discussion exercise to review the different variations of hot, ground, and neutral wires.

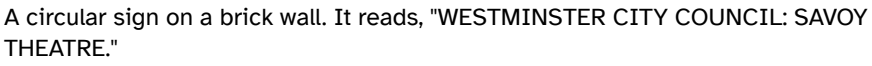


Figure 3.1. Opened in 1881 the Savoy Theatre was the first public building in the world to be lit throughout by electricity.

In 1881, electricity powered the Savoy theater’s lights in London, England.[1] This same year in Paris, France, the International Congress of Electricians convened at the first International Exposition of Electricity. This conference debated electrical standards from an international perspective. At that time, they gave recommendations for standard electrical nomenclature: the “ampere, volt, and ohm, as practical units for current, pressure (voltage), and resistance.”[2] These terms achieved legal status 12 years later at the Chicago Columbian World Exhibition in 1893,[3] and this codification continues today, with an additional unit called wattage.

Wattage (watts) is the measure of the power of a lighting instrument and is shown by the letter W. For example, a bedside lamp in the home is around 60 W to 100 W. On a film set our lights vary from, e.g., 150 W, 300 W, 650 W, 1,000 W, 2,000 W and more. Imagine you are watering your garden. Wattage is the faucet controlling the water for the hose. The more you turn the faucet on, the more water gets into the hose.

The ampere (amp) is a unit of constant electrical current. The amperage is the strength of the electromagnetic force between two electrical conductors, i.e., the measurement of the electrical current. A basic household circuit contains 15 amps, i.e., the amount of electricity running through a circuit. In modern homes, and particularly larger appliances, e.g., refrigerators have 20 or 30 amps. Think of that garden hose with water running through it as the amps.

A circuit is a closed loop that allows electricity to flow to a device. The circuit is the piping that allows the water to get to the faucet for the garden hose. There are two types of circuits: the direct current, aka DC, that allows an electrical charge to flow in one direction. For example, batteries, generators.[4] The alternating current, AC, allows the charge to flow periodically in both directions.[5]

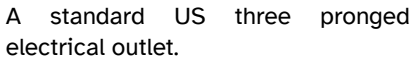


Figure 3.2. Household circuit.

Voltage is the force behind the flow of electronics, or in other words the measurement of the electrical power in the outlet. The normal household voltage in the USA is 120 V. If you are in the UK, this voltage is 220 V. However, our high voltage film studios have 240 V. Volts are the water pressure in the hose. So high voltage is high pressure.

Ohm is the resistance against the flow of the current. Think of the size of the garden hose. Decreasing the size of the hose means decreasing the flow of the water.

Materials that conduct electricity, allowing it to flow freely, are called conductors; one common example is copper. Materials like plastic and rubber which prevent electricity from passing through them are insulators. Working on a set, the crew should be wearing rubber-soled footwear. This nonconductive material has a small level of protection by preventing the wearers’ feet from completing an electrical circuit to the ground.

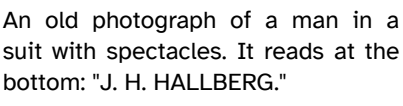


Figure 3.3. Josef Henrik Hallberg.

The earliest analogy comparing electricity with water hoses and pipes comes from Swedish-born Josef Hallberg, who moved to the USA in 1890. He became an electrical engineer with the General Incandescent Art Light Company and was an associate member of the American Institute of Electrical Engineers. Hallberg developed a “complete line of modern enclosed arc lamps, alternating-current regulators, automatic transformers, switchboards, and protecting devices. He has also engineered many important street lighting installations, the most notable of which is the street lighting system in Cincinnati, OH.”[6]

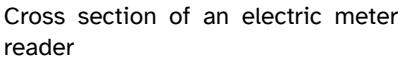


Figure 3.4. Josef Henrik Hallberg’s meter reader.

Hallberg became interested in the burgeoning motion picture industry, particularly the electricity for picture houses. In 1908 he was granted a patent on his electric “Economizer” and was allowed to name arc lamps, special terminals, and connections for use in picture houses.[7] In his book, *Motion Picture Electricity* he states,

> Voltage is the word which signifies the pressure of the electric current on or in an electric circuit. Suppose you have a water pipe one mile long and at the end of it there is a faucet and just ahead of the faucet a water pressure gauge is connected to the pipe, and the gauge indicates no pounds. Now open the faucet and you will see that the pressure gauge needle will fall back, depending upon the size of the pipe and how wide you open the faucet. If the pipe is small, the friction the water creates in flowing against the pipe wall will cause the pressure at the end to drop very low.[8]

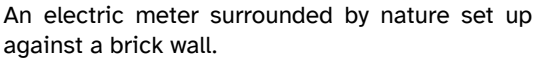


Figure 3.5. Modern electrical meter

He continues his water pipe analogy with the following:

> Ampere is the word which signifies the quantity or volume of electricity flowing through an electric circuit, arc lamp, incandescent lamp, motor or other machine, connected to the circuit. The measurement called “gallon” in the water system, or cubic foot for gas, designates quantity or volume. So does the ampere in the electric system.[9]

Figure 3.4 shows an early example of his electrical meter reader. When you look at the modern meter reader in figure 3.5, you can see that little has changed over the years.

West Virginia Formula

The ability to count amperage is the most basic tool required as a spark on set. Your production relies on it and is a potential safety hazard. (see Chapter 2, SOS). The 1st AD and relevant heads of department should discuss hazards, conduct and record risk assessments, and conduct regular safety meetings to ensure people are clear on how to stay safe. Calculating how many lights can safely be used on one circuit needs some math, but you do not need a calculator. Ohm’s law sounds professional and scary if you are like me, afraid of math. I use the West Virginia Formula—as it is easier for me to remember the state initials WV and the letter A.

The letter W corresponds to watts, i.e., power of the light (e.g., 1,000 watts). The letter V is for voltage (e.g., 220 volts), and letter A equals amps, the current (e.g., 10 amps). Hence, wattage = voltage multiplied by amps. W=VA.

So let us do some math. How many babies (1000 watts) can fit into one household socket (110 volts) using 20 amps in the US?

W = VA (Watts = Voltage x Amps)

1,000 watts = 110 volts x 20 amps = 1,000 divided by 2,200 = 2.2 babies.

You can err on the side of caution by using 2 babies and you still have 200 watts left over.

You can also calculate how many amps would be needed for 1 light.

A = W/V (amps = watts divided by volts)

1,000 watts divided by 110 volts = amps needed = 11 amps.

Transmission Lines

Electricity is generated by various sources, including nuclear, gas, hydroelectricity, solar, wind, and coal. For our homes, these power stations supply energy via a substation, a transformer, the household circuit breaker, and the circuit.

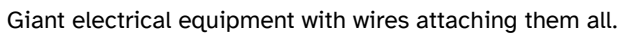


Figure 3.6. Substation, Smeaton.

A giant power station.

Figure 3.7. Gateway Generating Station

Transformer

The transformer is on a pole mounted outside buildings, e.g., 34,000 volts. It has a transmission (distribution) line snaking into the building and transforms the voltage to 110 V (e.g., USA), or 220 V (e.g., UK), or even 240 V (high volt studios).

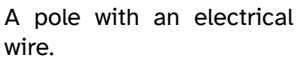


Figure 3.8. Single-Phase Pole Transformer.

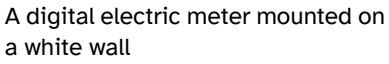


Figure 3.9. Electric board from transmission line into building.

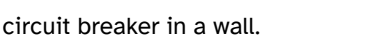


Figure 3.10. Each breaker should be clearly labeled.

Circuit Breaker

This distributes electricity into separate circuits in the home, such as the bathroom, living room, bedroom, etc. A modern breaker should have each circuit clearly labeled. Always examine the circuit breaker in each location you are shooting in, make detailed notes, and take a picture of what room is connected to what circuit. For example, if the box says bathroom and living room, this means these two rooms are on one circuit. So, you could not run two babies in the bathroom and two babies in the living room without overloading the circuit.

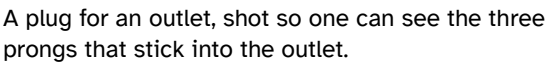


Figure 3.11. Three-pronged plug.

How Electricity is Connected and Wired

Connections

The National Electrical Manufacturers Association (NEMA) sets safety standards and standardizes electrical connectors used to connect power cords to electrical outlets for electrical plugs used in North America. These have defined configurations to prevent hazards and ensure electrical safety. In the USA, the basic standard connector (plug) has three prongs with 15 amps.

NEMA also has locking connectors, a twist-lock system that is a main feature of stage lighting and high-voltage studio systems. They are created so they cannot be accidentally pulled out of the socket. A 20-amp plug has a longer prong on one side, so you are unable to put a 20-amp into a 15-amp connector socket. They must be put into a twist and lock receptacle. These are also

called Edison plugs.

A 20-amp plug which is round and has the prongs pointing in different directions.

Figure 3.12. A 20-amp plug.

A twist and lock receptacle. It just looks like an outlet but with a mechanism visible on the edges.

Figure 3.13. Twist and lock receptacle.

A three-prong electrical outlet and light switch.

Figure 3.14. GFCI-ground fault circuit interrupters.

A Ground Fault Circuit Interrupter is an electrical device that protects against electric shock, burns, and electrocution. It works by comparing the amount of electricity flowing in and out of a circuit. It quickly shuts off the power if there is an imbalance. They are typically installed in areas where water and electricity are close together, such as in kitchens, bathrooms, and outdoors.

Wiring

In the USA, all connectors contain two or three color-coded wires. Other countries may differ slightly (e.g., all plugs in the UK have three wires), and if you are shooting in a foreign country, you should discover their electrical norms ahead of time.

- Hot (black) live, aka hot leg, runs into the service panel.
- Neutral (white) is run from the white center tap wire.
- Ground (copper or brown) ties into earth. Sockets are polarized (one blade slightly wider than the other) so it can only be inserted one way.

Four wires broken off at the ends in four different colors of plastic casing.

Figure 3.15. Color-coded electrical wires

Take care, however, as international colors are usually:

- Hot – red
- Neutral – blue
- Ground – yellow/green

Wire color codes are different across regions.

I come from Scotland, UK, which follows the European system. So not only are the wires different colors from the USA or Australia, but the voltage is different. UK homes contain 220 volts in a circuit, so our electrical plugs are all three prongs with amps that we change out when needed. Even a toaster has three prongs.

A CGFI circuit. It is a tied-together cable with charger items on either end, but one clearly is meant to plug into other parts and the other is meant to be the part a plug goes into.

Figure 3.16. High-quality stinger.

Extension Cords

> “Can I have a 25-foot stinger?”

The nickname for an extension cord is a stinger. However, unlike a regular extension cord, a stinger consists of industry-standard, high-quality cable and can carry the whole amp requirement of industry lighting and tools. The amperage rating of a film industry stinger matches the maximum amperage rating of a 20-amp electrical safety breaker switch. Extension cords purchased at a local hardware store are often only rated for 15 amps, so the gauge is smaller.

At the ends of the extension cord above are male and female plugs, aka Edison plugs. These are constructed with high-quality plastic that is extremely important for safe and extended conductivity of electricity. They are also strong enough to withstand the

constant unwrapping, use, and re-wrapping for storage and transportation.

Normally 25- or 50-foot-long, stingers are typically black to avoid reflected light spilling onto the set. It is made up of 12/3 wire, which refers to the gauge (diameter), i.e., 12 gauge, and the number of wires, i.e., hot, neutral, and ground. It is a heavier gauge than what you would use at home since it can handle 20 amps.

The bigger the gauge number, the narrower the gauge, and consequently, the less amperage it can carry. (rule of opposites again). Stay away from bargain 16-gauge. Use 25- or 50-foot 14-gauge cables. If you need more than 50 feet, then use 12-gauge cables. If using a generator, use 10-gauge! If over 150 feet use an 8! Below gives an outline of what gauge to use depending on.

Summary

Electrical transmission comes from the power station, into the substation, through the transformer, and into the house circuits via the board and circuit breaker. NEMA safety plugs, connectors, and cables are all designed to carry electrical current as safely as possible. This chapter helps students to understand how plugs are wired, the related colors, and how to safely calculate load. If the crew are always on the lookout for electrical hazards and take the appropriate precautions to reduce the likelihood of serious accidents, then people will remain safe.

Chapter Review

Group Exercise

In small groups of two or three, read and discuss the review section below. When you reach the five questions, try to answer them and discuss them with your group.

Review: Hot wires carry power (voltage) from the electrical panel to its destination. A ground wire carries electricity to the ground during an abnormal electric current. Electronic switches require a tiny amount of constant electricity, so a neutral wire is required to run to them. Neutral wires carry electricity back to the electrical panel.

Figuring out what wire color does is an effortless process if you remember basic colors. Let us begin with red, white, and brown.

- Red is the hot or live wire carrying the electrical current—think of red as meaning danger.
- White is the neutral wire—think of waving a white flag for a truce/neutrality.
- Brown is the ground wire—think of brown earth in the garden.

From those colors, you might have variations such as black, orange, blue, yellow, copper, green and yellow, and even gray. Some homes that are older have older style colors, so this is why it is important to be able to figure out what a “weird” one means.

- If you think that a live wire signifies danger, then you can figure out that the red wire is a live wire.
- Orange is also a warning sign, so it is a live wire.
- Blue is the color of the sun (remember your kelvin’s blue = outdoor light), so another hot wire. However, there are some occasions when this is a neutral color, so you must figure out the other two wires to see if it is really a hot wire.
- Black is death, so it is a hot wire.
- Copper is shiny brown, so in essence, it is the ground wire.
- Green is the color of grass. Grass is in the earth, so it is a ground wire too.
- Green with a yellow stripe is still like an earth color, so it is a ground wire.
- White is a neutral wire—it still carries an electrical current.
- Gray is almost white, so a neutral wire still carries an electrical current.

Questions to discuss in the group:

1. I open up a plug and find a blue wire, a white wire, and a brown wire. What wires are live, ground, and neutral?
2. I open the plug and find a red, white, and green wire. What wires are live, ground, and neutral?
3. I open the plug and find a blue, white, and yellow/green wire. What wires are live, ground, and neutral?
4. I open the plug and find orange, white, and copper wire. What wires are live, ground, and neutral?
5. I open the plug and find a red, green, and gray wire. What wires are live, ground, and neutral?

Interactive Quiz

Interactive Content

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9. Ibid., p. 12. 1.03: Electricity#return-footnote-31-9

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Chapter 4: Lighting and Visual Composition

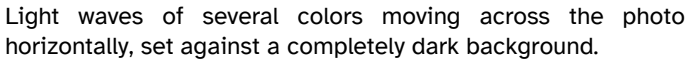


Figure 4.1. Light waves.

The lighting crew plays a vital role in contributing to a film's look and style. The gaffer works closely with the DOP and director to implement lighting techniques, which enhance visual composition to advance the story and convey the desired mood, character, and tone. This chapter outlines the functions, quantities, and qualities of light. Also covered are the main compositional rules, which include the rule of thirds, triangular rule, Dutch tilt, and picture-in-picture. It also outlines the use of deep focus versus shallow depth of field and racking focus versus pulling focus. Photos supplement the descriptions of each compositional rule.

Light consists of waves of electromagnetic energy that reflect off physical objects onto the cornea of our eyes. These waves focus on our retina and are converted to electrical impulses that the brain interprets.

A camera lens acts like our eyes, just not as sensitive.

- The lens gathers light.
- The lens focuses the light through the aperture (iris).
- The light moves on to the sensor (e.g., CCD, CMOS).
- The sensor converts the light to information for saving or reproducing.

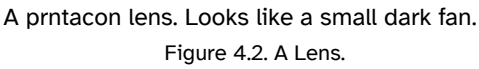


Figure 4.2. A Lens.

Functions of Light

There are several functions of light. The dark and light areas within a frame help create the overall composition of each shot, guiding our eyes to certain objects and actions. In addition, light:

- Creates mood, texture, and style
- Creates on-screen and off-screen space
- Creates time (day, night, era)
- Enhances atmosphere
- Conceals or highlights details
- Creates meaning
- Develops character, plot, and themes

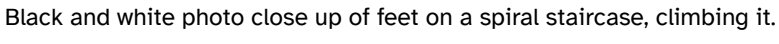


Figure 4.3. Dark and light staircase.

Quantity of Light

The quantity of light is measured in lumens. This is the international standard unit. Lumen is the amount of power emitted from a lighting fixture. Wattage is the amount of power in the bulb. Illuminance is the brightness of the light as it strikes a surface and is measured in foot candles or lux. One foot candle is 10.76 lux. We can measure these using our light meters.

Contrast

Contrast is the comparison between the brightest and darkest elements within the frame. Contrast ratio compares the luminance reflected off the surfaces in the frame. Thus, if the lightest surface is 200-foot candles while the darkest is 10-foot candles, the contrast ratio is 20:1.

A greyscale chart represents the gradations of tone between pure white and pure black. An image in high contrast shows strong

blacks and whites that reproduce the extremes of the grayscale.



Figure 4.4. Grayscale chart.

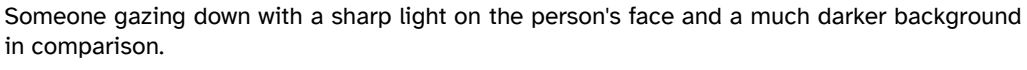


Figure 4.5. High contrast.

Low contrast: composed of tones that fall close together on the grayscale. See the shot below.

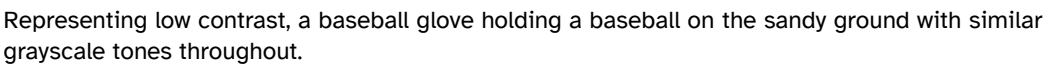


Figure 4.6. Low contrast.

Quality of Light

Hard Light

Hard light is made up of tones that fall close together on the grayscale. Hard light has dark shadows and sharp edges. The highlights are distinct and harsh, which emphasizes texture and spotlights the subject for an intense look. Examples of light sources that produce hard light would be the sun on a clear day, streetlights, or car headlights.

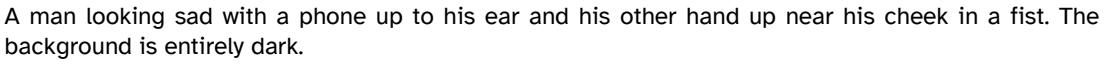


Figure 4.7. Hard light.

Soft Light

Soft light has diffused (scattered) shadows, soft edges, and subtle highlights. Techniques for producing soft light include cloudy days, fog, flooding the light instrument, bouncing the light, using soft boxes, and umbrellas.

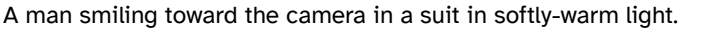


Figure 4.8. Soft light.

Direction

The illusion of depth is created by how shadows fall on an object. It makes two-dimensional images appear three-dimensional and molds the subject/object in the frame. The next image employs soft lighting, and direction is coming from your left side. Note how the character is on your right-hand side. The placement of a character in this position on the screen is covered later in the chapter but implies negativity, or that she could be unhappy or sad in this image.

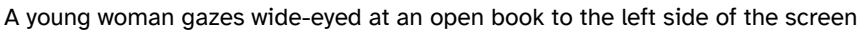


Figure 4.9. Direction of light.

High Key vs. Low Key Lighting

High key lighting is characterized by even bright illumination in a shot where there are few shadows and lower contrast. The background is well lit, and all the main characters and details are clearly visible. It is often used to convey an atmosphere of fun, honesty, or happiness. a darker image with lots of shadows, lots of concealed details conveying a more threatening, foreboding, or mysterious atmosphere.

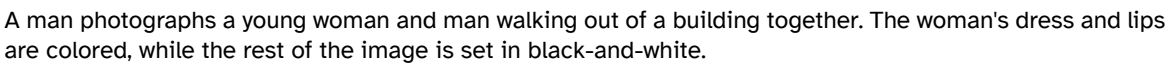


Figure 4.10. High key lighting.

A young man reads a book behind prison or jail bars with a chain on them.

Figure 4.11. Low key lighting.

Color

The use of color is a powerful, psychological tool for filmmakers as it sets the mood, tone, and characters in a film. The director of photography and director deliberately choose color palettes for a film in order to manipulate the emotions of the audience.

There are three essential terms when it comes to color:

- hue: color itself (red, green, etc.)
- brightness (discussed before)
- saturation: intensity of the hue (pale, dark, etc.)

Close up

Luma and Chroma Color Sampling

Interactive Content

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A young woman looks at a newspaper with a photo of a young woman in a red dress. The image is black and white except for the red dress and a nearby red book of matches.

Figure 4.12. Black, white, & red.

close up of well-worn red chairs lined up.

Figure 4.13. Red seats.

A clock on the ground surrounded by shards of glass. Light is cast on it, while the other side of it and the image is cast in darkness.

Figure 4.14. Clock.

Color Temperature: The Kelvin Scale

British physicist William Kelvin studied the nature of heat. In 1848, he published a paper that proposed an absolute temperature scale called the kelvin scale. *

A painting of a man with a beard and wearing a suit.

Figure 4.15. William Kelvin.

Color temperatures are expressed in units called kelvins and not capitalized unless at the start of a sentence. In media circles you will often hear it referred to as degrees kelvin. The symbol for kelvin is K (ex: 3,500 K).

The Kelvin color temperature chart. It includes: "Candlelight: 1,000K. Tungsten: In-between. Then 2,000K. Sunrise: In-between. Household Light: 3,000K. Then 4,000K. Flash: In-between. Then 5,000K. Direct Sun: In-between. Then 6,000K. Overcast: Slightly above 7,000K. Then 8,000K and 9,000K. Sky: 10,000K.

Figure 4.16. The Kelvin scale.

Outdoor Light

Characteristics of outdoor light:

- extremely **hot**
- **blue** in color
- 5,800-20,000 K, depending on the weather conditions

Indoor Light

- tungsten **cool –** Also known as an incandescent bulb, tungsten lamps have the wire filament in the glass globe.
- **red** in color
- 2,800-3,500 K

Sources of Light

Natural Light

- daylight: white/blue
- sunset/sunrise: golden hour, witching hour, golden glow
- twilight: ghostly blue

Light falling on the counter of an ice cream shop with scoops and debris strewn.

Figure 4.17. White daylight.

Artificial Light

There are several main types of lights used in filmmaking. They are discussed in more detail in Chapter 5, Types of Lighting Instruments.

- Quartz: such as Fresnel, tungsten balanced (3,200K).
- Hydrargyrum Medium-arc Iodide (HMI): mimics sunlight but is very expensive and needs a ballast for powering the fixture.
- Fluorescents: have a greenish hue and are not very flattering for actors' skin tones.
- LEDs: do not get hot and are a relatively recent invention for light fixtures.

Hands working to unlock a lock with chains on what look like prison or jail bars.

Figure 4.18. Artificial light.

Mixed Light: Interior and Exterior

Notice the inside is reddish orange and the outdoor light is blue

A hand holding a piece of bitten bread. There is a bowl and large spoon with some leftover food in it on the table in front of the person. There is also an old-timey jug. The table is lit while the person is cast in shadow. There are some kind of pipes on the table.

Figure 4.19. Mixed lighting.

Visual Composition

Framing

See also Section J PowerPoints, Chapter 4 Review PowerPoint, A Review. A frame can be a canvas that is painted upon, wood around a painting, a still photo, or a digital film image. There is power in the frame, and the idea of what a frame is defines, or shapes, a certain reality. Aesthetic principles are at work within the frame and are key to storytelling and impacting the audience. The shape of the frame can be square, rectangular, triangular, horizontal, vertical, round, or oval. However, the moving image conforms to the horizontal rectangle (digital film), horizontal square (TV, computer), or even vertical (cell phone cameras).

Each part of the moving image has proportions called the **aspect ratio**—high versus wide in size. Have a look at the proportions below. The usual aspect ratio for digital film is 16:9. (1.78:1). High-Definition TV (HDTV) has a 1.85:1 aspect ratio.

Stacked graphic comparing film aspect ratios using colored horizontal rectangles labeled 1.33:1 (4:3), 1.66:1, 1.78:1 (16:9), 1.85:1; each wider bar visually increases in width

Stacked graphic comparing film aspect ratios using colored horizontal rectangles labeled 2.35:1, 2.75:1, and 4.00:1; each wider bar visually increases in width, with a bottom strip layering all ratios for side-by-side comparison.

Figure 4.20. Aspect ratios compared.

Widescreen movies (2.40:1) do not fit onto a television screen (unless you have a widescreen TV). The same goes for the 16:9 proportions that do not fit into a square screen. To accommodate these differences, there are various methods.

1. Letterbox: bars at top and bottom.
2. Pillar box: 4:3 maintained with black bars at the side.
3. Window box: both methods combined, not very aesthetically pleasing.

Compare the images below. The original shot in figure 4.21 is a 16:9 ratio. Look at how this same shot looks on a small screen with a 4:3 aspect ratio (figure 4.22). Can you see the difference?

Someone wearing sunglasses and riding a bike centers two people jogging beside him.

Figure 4.21. 16:9 example.

The same picture as previous, but cropped to only show two out of the three people.

Figure 4.22. 4:3 example.

The change in aspect ratio has a lot of valuable information missing. In this one a whole character would be missing! So, letterboxing will help preserve the 16:9 aspect ratio. See figure 4.23 showing how letterboxing preserves the information from the original images. I have had many students who deliberately put bars on their work to make it look more cinematic!

Figure 4.24 is an example of pillar boxing, but I have deliberately not made the image accommodate the size to show you what would be missing.

The same image as previous, uncropped, with black space on the top and bottom to allow the image to be square.

Figure 4.23. Letterboxing

The same image as original, partially cropped, with black space on the left and right to allow the image to be rectangular.

Figure 4.24. Pillar boxing.

Figure 14.25 below is a window box, and it can have its uses. For example, if we start with this window box and pull out to reveal the original 16:9, it can be a visual storytelling tool. I have deliberately not made the image accommodate the size of the original shot.

Figure 4.25. Window boxing.

Screen Direction

Screen direction, also known as camera direction, is another powerful tool in the filmmaker's toolbox. It is the direction a character or object (e.g., car, ball) moves or faces the screen from the perspective of the audience. So, we talk about whether a character is moving screen left or right. By the same token we can also say camera left or right. The terms mean the same thing. Please note that this is not camera movement; it is camera *direction*.

The use of screen direction is important for communicating mood and visually organizing the logistics of onscreen action. It preserves the continuity of motion, so the viewer is not confused about where the character or object is going. For example, you are filming an interrogation scene; a simple table inside a bare room. The police and villain are sitting on chairs, across from each other at the table. One would be on one side (screen left) and the other on the opposite side (screen right). If you had both on the same screen side, confusion arises for the audience as it seems they are now sitting beside each other instead of on opposing sides. Unless you want to confound the audience, consistency is key when using screen direction.

When a character is placed on your left-hand side inside the filmic frame, this is called positive screen direction. If we have been taught the western technique of reading and writing, we find it natural for our eyes to follow your left-hand side towards your right-hand side. If we place a character facing or moving in this positive direction, then the character is e.g., happy, having a good day, having an upper hand, or is more trustworthy.

If the viewer must look in the opposite direction (your right hand to left hand side) then psychologically it is harder to read. This is called a negative screen direction. For example, if you want your character to be having a bad day, whether it be a fight scene or just feeling sad, then place the character on your right hand of the screen. If the character is having a good day, getting the upper hand in a fight scene, then you have your character screen on your left-hand side. Good directors know this and use it to full effect to manipulate viewers' impressions of a character. Politicians use screen direction all the time, especially during crucial presidential debates—whoever wins the toss is on the audience's left-hand side: the more powerful, positive, trustworthy stance than the opposing candidate on the right-hand side.

This is all set on the right-hand side, representing negative screen direction. Someone wearing sunglasses and smiling while standing by a lake or ocean with a boatyard in the background.

Figure 4.26. Negative screen direction: the character is shown looking from right to left from the viewer's perspective.

See below for a positive screen direction—your left to right. This direction can connote that the character is happy, having a good day, hopeful.

This is all set on the left-hand side, representing positive screen direction. Someone wearing sunglasses and smiling while standing by a lake or ocean with a boatyard in the background.

Figure 4.27. Positive screen direction: the character is shown looking from left to right from the viewer's perspective.

Have a look at the fight scene in *Raiders of the Lost Ark* when Indy is fighting the bald Nazi on the plane. The villain is on your left-hand side on screen for most of the fight, and seemingly winning, until Indy gets the upper hand. The Nazi is switched to your right-hand side!

Screen direction is also important for knowing who is chasing who. If you have an antagonist coming from one direction and the protagonist coming from the opposite direction, then they are running towards each other instead of one chasing the other. Unless this is your intention.

Several frames stacked of various sizes.

Figure 4.28. Closed frame.

Closed Framing

At the most basic, below is an example of closed framing: the frames are not spilling out over the edge of this image. Is the pile of wooden frames floating midair, or is it on a table with a black backdrop? Is it supposed to be hung on a wall?

However, closed framing, otherwise known as a closed form, can also be when a character is constricted by either something (e.g., shelves), characters, or the frame itself. It gives you information about the psychological makeup and emotional state of a character.

Action

Look at figure 4.27 below and consider these questions:

- What does this frame tell you about the character?
- Is he a villain?
- Is he constrained behind bars?
- Does he feel trapped? Boxed in?
- Might the character feel something or someone is an obstacle to his goals or relationships?

close up of a hand holding a lit lighter and the person's face is partially visible between two railings.

FIgure 4.29. Picture in picture with bars.

Open Framing and Off-Screen Space

This type of framing gives the sense that there is a world outside the four sides of the frame. In the image below, the audience can imagine what the sniper is looking at.

Representative of off-screen space, two people are aiming guns toward some places off-screen. They are wearing protective tactical garb. They are by rocks and in a forest.

Figure 4.30. Off screen space.

Balance

If the composition is off balance, unconsciously it feels awkward and is usually an unattractive shot. Too much mass on one side of a frame can make it feel as if the subjects are tipping over. A lack of balance gives the sense of unease and feeling uncomfortable. There is too much headroom for the Medium Shot below. (See examples of medium shots later in the chapter).

An up-close shot of the backs of a man and woman sitting on a bench staring off at the sky, completely bright and empty in the photograph.

Figure 4.31. Balanced but bland.

Look at this similar shot, a long shot, that is wider and more balanced. It creates a sense of harmony and peace. What do you think the characters are feeling?

A wider shot of a man and woman from behind sitting on a bench staring off at a body of water.

Figure 4.32. Better balance.

Can you compare the neutral shot in figure 4.33 with figure 4.34? Do either of them feel better? Why or why not?

Representative of neutral composition, someone centered in the photograph is smiling with hands in pockets. Behind the person is fencing, rocks, and a lake or ocean. A boatyard is in the background on the right-hand side.

Figure 4.33. Central neutral composition.

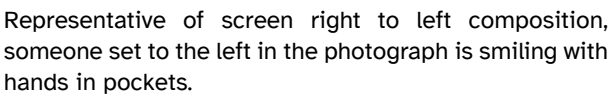

Representative of screen right to left composition, someone set to the left in the photograph is smiling with hands in pockets.

Figure 4.34. Screen left composition.

Main Compositional Rules

There are five main compositional rules:

1. Rule of thirds
2. Golden mean
3. Triangular rule
4. Dutch tilt, also referred to as canted angle
5. Picture-in-picture, also referred to as frame within a frame

Rule of Thirds

For the rule of thirds, the filmic frame is split into horizontal, vertical, and diagonal segments. With the focus usually in the center box. See the black cannon in the center below. See where your eye is drawn to? The gun and wheels draw the eye, emphasizing the power of the cannon. It is also aimed in the positive direction, connoting that these canons are on the winning side!

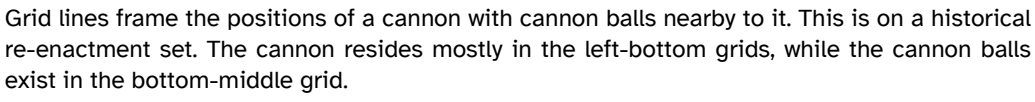

Grid lines frame the positions of a cannon with cannon balls nearby to it. This is on a historical re-enactment set. The cannon resides mostly in the left-bottom grids, while the cannon balls exist in the bottom-middle grid.

Figure 4.35. Rule of Thirds: canon.

However, you can also have the focus of attention on the crosshair lines, as in the shot below.

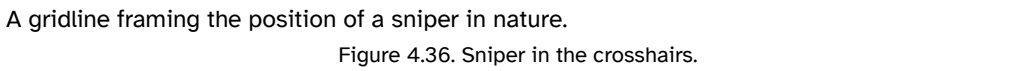

A gridline framing the position of a sniper in nature.

Figure 4.36. Sniper in the crosshairs.

You will find that *all* shots have the rule of thirds regardless of whether they are triangular, Dutch tilt, or picture-in-picture. They all have different contributions to manipulate the audience's feelings, whether it be happiness, unease, calmness, fear, etc. Below are examples of these compositional rules.

Symmetry and Asymmetry

Arranging your characters or objects centrally inside the frame, with equal space on each side, is called a symmetrical composition. If you bend the image in half, each part would be identical. This perfect balance conveys a harmonious feeling, one of control, and a sense of stability and stasis. It can also connote a sense of authority or power depending on the context of other characters and objects in prior shots and scenes.

An asymmetrical composition places characters or objects unevenly balanced in the shot. This forces the viewer to look around the screen, creating a feeling of dynamism and spontaneity. It can isolate a character from others in the frame and highlight, for example, their power or even powerlessness over others.

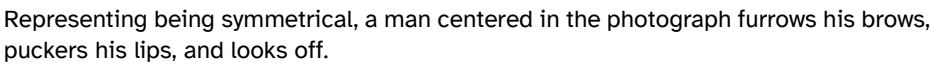

Representing being symmetrical, a man centered in the photograph furrows his brows, puckers his lips, and looks off.

FIgure 4.37. Symmetrical composition.

How does the asymmetrical framing in figure 4.38 below make you feel?

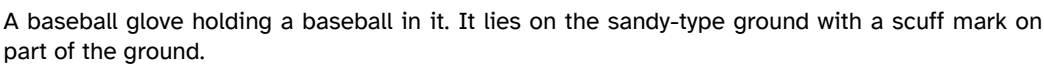

A baseball glove holding a baseball in it. It lies on the sandy-type ground with a scuff mark on part of the ground.

Figure 4.38. Asymmetrical composition.

A silhouette walking down a train track, cast in backlight and fog. There is a lamp with a weakly-glowing candle more in the foreground.

Figure 4.39. Symmetrical and rule of thirds composition.

Golden Mean 1:1.618

Below is a graph showing the golden mean. For our purposes, the measurements are less important than the shape and how it guides the eye. Train your eye to 'see' where the subject of your picture can be in the frame to get this look. You can see the focus of a subject would be at the bottom half, your right side of the graph.

Representing the golden mean, a spiral with grid lines.

Figure 4.40. The golden mean.

You could also focus on the other side; if you turn the graph upside down the focus would be at the top of the graph, your left-hand side. You can also make the focus on the upper other side too.

Representing the golden mean upside-down, a spiral with grid lines. The biggest colored square the grids are set in, covering the right-hand side and past the center into the left-hand side, is labeled 21 x 21. The next one, at the bottom-left, is labeled 13 x 13. The next one, at the top-left, is labeled 8 x 8. The next one, in the middle-left, is labeled 5 x 5. The rest are unlabeled but rest above 13 x 13 and below 5 x 5. The biggest is on the right at 3 x 3, then the next-biggest is at 2 x 2 and is below two small squares only covering one grid space each.

Figure 4.41. The golden mean reversed.

Representing the golden mean, someone sitting and gazing off in the bottom-right corner. He is below an outcrop near a waterfall falling into a small body of water.

Figure 4.42. Golden mean example.

The golden mean can also have the subject at the other end of the shot. Which shot gives a sense of hope?

Representative of the golden mean upside-down, a man sits on rocks in the water positioned in the top-left corner. He kicks at the water.

Figure 4.43. Golden mean reversed example.

Triangular Rule

This type of composition has all the visual elements placed within an invisible triangular (pyramidal) shape. The top of the pyramid usually contains the focus (e.g., antagonist) while the bottom contains secondary objects or characters. This composition creates a sense of harmony, stability, energy, vitality, and strength. Similar to an asymmetrical composition, this rule creates a dynamic movement that forces the viewer to look around the screen. This triangle can also be an inverted one giving a feeling of drama, instability, unease and even menace.

Can you see how the three characters in the shot below create a triangular shape?

Three men gazing up at something. They all wear cowboy-like outfits. The one in the front-center is in-focus. A low-hanging treebranch is in the background.

Figure 4.44. Triangular rule.

Can you see the triangle in the shot below created by the three central actors?

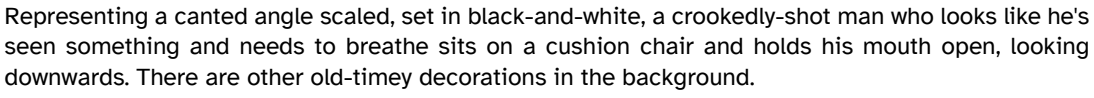
Can you see a wider triangular-shaped frame the three actors?

Two men look up at a man who has a rope around his neck; he is about to be hanged on a tree. They all wear old-timey garb, the men hanging him looking like cowboy sheriffs. Forest is in the background. Viewers are just-seen on the sides of the photograph in the foreground.

Figure 4.45. Another triangular rule example.

Dutch Tilt/Canted Angle

This more unusual composition is created by deliberately tilting the camera on its side so that the horizon line is no longer straight. This connotes a sense of unease and fear and often portrays an unstable character or world. Be careful though because if the shot is not tilted enough, it looks like an error, or too much tilt feels like a sinking boat; although the latter may be intentionally for a sinking ship. For further discussion regarding the Dutch tilt, see Chapter 9 Film Noir.

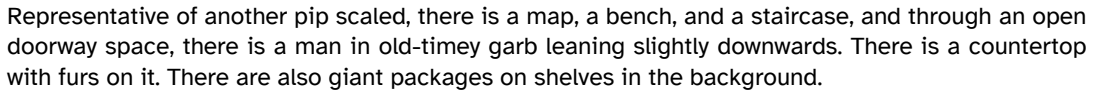


Representing a canted angle scaled, set in black-and-white, a crookedly-shot man who looks like he's seen something and needs to breathe sits on a cushion chair and holds his mouth open, looking downwards. There are other old-timey decorations in the background.

Figure 4.46. Dutch tilt or canted angle

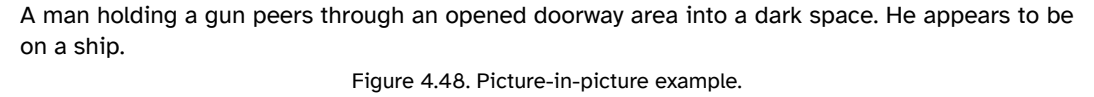
Picture-in-Picture/Frame Within a Frame

Frames can be created with furniture, doors, walls, foliage, and more!



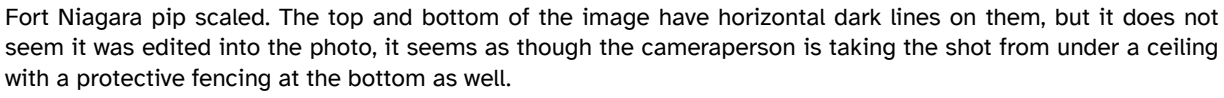
Representative of another pip scaled, there is a map, a bench, and a staircase, and through an open doorway space, there is a man in old-timey garb leaning slightly downwards. There is a countertop with furs on it. There are also giant packages on shelves in the background.

Figure 4.47. Picture-in-picture example.



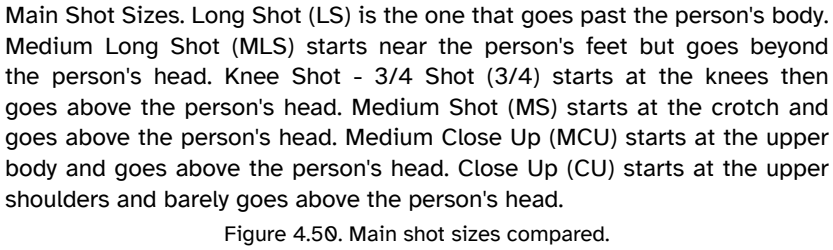
A man holding a gun peers through an opened doorway area into a dark space. He appears to be on a ship.

Figure 4.48. Picture-in-picture example.



Fort Niagara pip scaled. The top and bottom of the image have horizontal dark lines on them, but it does not seem it was edited into the photo, it seems as though the cameraperson is taking the shot from under a ceiling with a protective fencing at the bottom as well.

Figure 4.49. Picture-in-picture example.



Main Shot Sizes. Long Shot (LS) is the one that goes past the person's body. Medium Long Shot (MLS) starts near the person's feet but goes beyond the person's head. Knee Shot - 3/4 Shot (3/4) starts at the knees then goes above the person's head. Medium Shot (MS) starts at the crotch and goes above the person's head. Medium Close Up (MCU) starts at the upper body and goes above the person's head. Close Up (CU) starts at the upper shoulders and barely goes above the person's head.

Figure 4.50. Main shot sizes compared.

Shot Sizes

In the early days of cinema, the camera was placed in such a manner as to show the audience the whole area inside the filmic frame; the time, the place, mood, and characters. Nowadays we call this the extreme long shot, establishing shot or general view, and the functions of this type of shot remain the same. As film grammar evolved, different shots were experimented as to how much detail was shown, for example, a close up (CU) that only shows a small part of someone or something. The list below has the common vernacular used on a film set for different shot sizes.

- Extreme long shot, general view, establishing shot (ELS/GV/ES)
- Long shot (LS)
- Medium long shot (MLS)
- Knee shot or ¾ shot (KS)
- Medium shot (MS)
- Medium close-up (MCU)
- Close-up (CU)

Types of Close Ups

- close up (CU)

- big close up (BCU)
- very close up (VCU)
- extreme close up (ECU)

Close Up (CU) starts at the upper shoulders and goes up above the person's head. Big Close Up (BCU) starts at the upper neck and goes above the person's head. Tight Close Up (TCU) starts at the chin area and does not go above the upper forehead/hairline. Extreme Close Up (ECU) shows only the eyes.

Figure 4.51. Close up shot sizes.

Headroom

Be careful with headroom in your shots. Too much or too little looks odd, but it depends on the size of the shot. Generally, keep the subject's eyes a third of the way down the frame.

Composition Gallery

Interactive Content

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Breaking Rules

Interactive Content

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Lighting Summary

Aspects of lighting:

- functions: meaning, mood, texture, conceals, illuminates, time, place, space, character, plot
- types of measurements: lumens, lux, and kelvins
- quantity of illuminance: brightness, contrast, high, low
- quality: hard, soft
- direction: key, fill, back, high key, low key
- color: hue, brightness, saturation, indoor, outdoor
- sources: natural, artificial

Chapter Review

Knowledge Check

Interactive Content

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Exercise

Analyze the following shots by answering the questions below for each:

1. Are they indoor or outdoor lighting?
2. Hard or soft quality?
3. High key or low key?
4. What emotions do the colors create?
5. What screen direction are the characters facing?
6. What direction is the light coming from?
7. Are they long shots, medium shots, etc.?
8. What compositional rules are they following, e.g., rule of thirds, etc.?
9. Are they shallow depth of field—background or foreground?
10. What part of the filmic frame am I drawn to?
11. Is the shot breaking the rules? If so, can you think about why?

View into a dim interior framed by a doorway, where a person in period clothing stands near a work surface; strong backlight from a window creates depth, atmosphere, and a layered composition through the doorway.

Figure 4.52

Medium shot of a person holding an open file folder in a modern interior; tall window frames and ceiling slats create strong vertical and horizontal lines that direct attention toward the centered subject, while the folder forms a foreground shape that anchors the composition.

Figure 4.53

Extreme close-up of a face beneath a hat brim, with the eyes tightly framed; shallow focus and tight cropping emphasize detail and intensity.

Figure 4.54

Medium close-up of a person in a red-lit interior, positioned slightly off-center and facing another blurred figure at frame right; shallow depth of field isolates the subject against a soft, warm-toned background.

Figure 4.54

Medium shot of two figures in a dim interior; warm, directional light and layered background elements create depth and focus on their interaction.

Figure 4.55

Extreme close-up of a small carved chess piece held in the foreground, sharply in focus against a heavily blurred face; shallow depth of field and centered framing emphasize the object as the primary visual point.

Figure 4.56

View from inside a car frames a person in the foreground at right and a second person exiting a house at center; the car window creates a natural frame while shallow depth of field separates foreground observer from midground action.

Figure 4.57

Wide night shot of a porch lit by warm practical lights, with figures descending stairs; strong contrast and deep shadows surround the lit architecture, using symmetry and leading lines to draw the eye to the central entry.

Figure 4.58

Chapter 4 Student Resources

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Ursa Mini Cheat Sheet	04_Lighting & Visual Composition	PDF	
Cameras and Sensors PPT	04_Lighting & Visual Composition	Google Slide (view only)	
Luma and Chroma PPT	04_Lighting & Visual Composition	Google Slide (view only)	

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Chapter 5: Types of Lighting Instruments

There are hundreds of lighting instruments to choose from. Technical and aesthetic demands will determine the correct fixtures, and no project is ever the same. This chapter covers the four main light sources: tungsten, tungsten-halogen, LEDs, and HMIs, and three types of light fixtures: open-faced, PAR, and lensed instruments. Different configurations of film industry lighting instruments, such as the Tota-Lite, Sky panels, and M18, are discussed. The pros and cons of the sources and fixtures, along with jargon such as tweenies, seniors, and kickers, are explained. Diagrams will show the main elements of lighting instruments, such as the housing, yolk, bulb, filament, sled, and reflector. Xenon, Metal-Halide and High Efficiency Plasma (HEP) are uncommon light technologies, so they are not covered in this chapter. However, tungsten, tungsten-halogen, LEDs, fluorescent, and HMIs are the main types of light bulbs used on film sets today.

Close up

How to choose your light:

- **Output:** Determine the amount of light, color, temperature, and quality needed for the project.
- **Power source**: Determine whether mains, electricity, batteries, or generators are required.
- **Portability and size:** Consider lights' size, weight, portability, and ease of use.
- **Budget:** Know your budget and balance light features with affordability.
- **Reputation and brand:** Pick reputable brands. Cheap unknowns can let you down and ultimately cost more money in the long run.

A tungsten light bulb, lit up in the dark.

Figure 5.1. Tungsten light bulb.

Light Sources

Incandescent/Tungsten Light

Incandescent lighting is the easiest, most robust light technology. These lamps are cheap and emit a smooth spectrum of light, which is better than any other artificial sources. Bouncing a tungsten source off a gold reflector and onto a character's face enhances their natural skin tones. Since the color from tungsten bulbs is kinder to skin tones, these bulbs are used in practicals**.**

Focus! A **practical** is a light source that the audience can see in the frame, such as a bedside table lamp, candles, or office strip lights.

From bottom to top, gradient from orange to blue: Kelvins run from 1,000 K on bottom to 10,000 K, with labels showing where different types of light fall in the scale, with candlelight being lowest and other artificial light as the scale increases to direct sun at just above 5,000 K and sky at the top.

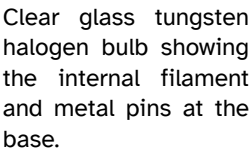
Figure 5.2. Kelvin scale.

Incandescent lights pass an electrical current through a tungsten filament wire. This filament heats up and glows. Incandescent light is interchangeable with tungsten light, named after the filament metal. Dedolights and open-faced lights are used for this type of lighting.

See Chapter 4, Lighting and Visual Composition, for more information about color temperature.

The filament in a tungsten bulb has a temperature of 2,800-3,500K. Consequently, the color of the light emitted is red to orange and classified as indoor color temperature. In contrast, the surface of our sun is 5,778K, rendering the color of outdoor light blue.

Tungsten-Halogen



Clear glass tungsten halogen bulb showing the internal filament and metal pins at the base.

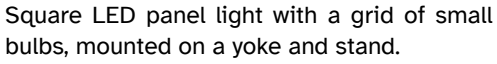
Figure 5.3. Tungsten-halogen/quartz halogen bulb.

This is a more advanced type of bulb than the incandescent one. Also called a quartz halogen, this type of bulb has a tungsten filament but is enclosed with a quartz envelope. This container is filled with halogen gas (iodine or bromine) and creates a chemical reaction, resulting in an efficient, bright light source. It allows for higher color temperatures and lasts longer due to the cycle of the gas. It is small, inexpensive, and can be used in car headlights, spotlights, household lamps, and projectors. The Dedolight is a branded example of this fixture used in the industry.

LEDs

While working for General Electric in 1962, American engineer Nick Holonyak Jr. invented a semiconductor laser diode that emitted visible light, pioneering the revolutionary Light-Emitting Diode (LED) lamp that we use today.[1] This lamp can match tungsten or daylight color temperatures. LEDs are rapidly replacing tungsten lamps on the market. Below is an example of an LED commonly used in film sets.

Professors Isamu Akasaki, Hiroshi Amano, and Shuji Nakamura developed LEDs that emit blue light in the 1990s.[2] Their work paved the way for a generation of energy-efficient, color LED screens. “Gallium nitride was the key ingredient used by the Nobel laureates in their groundbreaking blue LEDs.”[3] LEDs are revolutionizing everything from landscape lighting to VR headsets. I visited the Las Vegas Sphere in March 2024, which had just opened six months earlier. Millions of LEDs lit up enormous screens inside the sphere and “transformed the exterior into almost any pattern or image you can imagine.”[4]

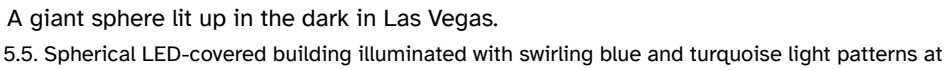


Square LED panel light with a grid of small bulbs, mounted on a yoke and stand.

Figure 5.4. Astra 6X Bi-Color LED Light Panel.

Benefits of LEDs:

- extremely energy efficient, saving on costs
- last up to 100,000 hours (about eleven and a half years)
- do not get hot
- deliver high-quality light that does not degrade over time
- can be battery operated
- easy to dispose of; no toxic elements
- can have remote-controlled dimmers



A giant sphere lit up in the dark in Las Vegas.

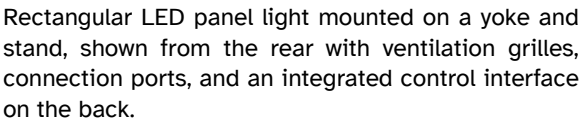
Figure 5.5. Spherical LED-covered building illuminated with swirling blue and turquoise light patterns at night.

In 2015, Arri released their Sky Panel LED fixture. Varying in size, they are ultra-bright, high-quality LEDs that create soft light. These are best used as fill lights, as they struggle to create harsh shadows. The maximum power consumption for one of these is 400 W. Larger LED sky panels are very heavy and require two people to place onto a combo light stand.

Focus!

Combo Light Stands: A combo is a heavy-duty light without wheels. It is called a “combo” since it can be used for reflectors as well as lights.

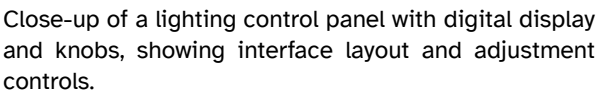
Rectangular soft LED panel with a flat diffusion surface, mounted on a support frame and stand.



Rectangular LED panel light mounted on a yoke and stand, shown from the rear with ventilation grilles, connection ports, and an integrated control interface on the back.

Figure 5.6. Front and rear views of the Arri SkyPanel LED light unit.

A dimmer control panel adjusts the color temperature between 2,800K and 10,000K, but also can utilize the entire RGB spectrum. These units should never connect to a dimmer circuit as they will become permanently damaged. There is also an app (*Stellar*) that allows for remote control of the color temperature panel. It also has a plethora of presets for effects, such as police and flickering campfire light.



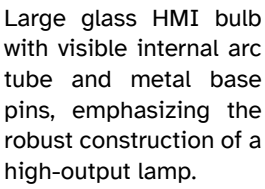
Close-up of a lighting control panel with digital display and knobs, showing interface layout and adjustment controls.

Figure 5.7. Arri SkyPanel color temperature control display.

It can operate at ambient temperatures ranging from 2,800K-10,000K. This light can operate from a standard outlet or battery pack; however, if using household outlets, you *must* use the external power supply unit to adapt the AC power to DC power. The standard power supply input range is 100 to 240 volts, while the battery pack voltage is much lower at 23 to 26 volts.

HMI and Ballast

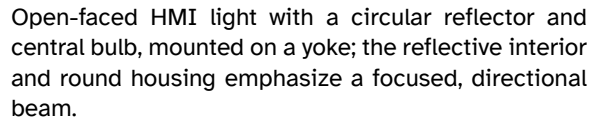
Hydrargyrum medium-arc iodide (HMI) lights create light with a color temperature of 5,600K, giving off a bright, white light that mimics sunlight. HMIs produce efficient, high-quality light, but are extremely expensive. They are particularly good when mixing indoor and outdoor light. They can be used for day-for-night shots to simulate exterior night by using them as bounce or fill. If you dial down your camera color balance settings to 3,200K, the HMI temperature will be blue and seem like moonlight. Below is an example of an HMI bulb.



Large glass HMI bulb with visible internal arc tube and metal base pins, emphasizing the robust construction of a high-output lamp.

Figure 5.8. Example of an HMI (hydrargyrum medium-arc iodide) bulb.

Arri is the major manufacturer for HMIs, and Arrisun is their PAR daylight fixture. There are other brands such as Silver Bullet, Film Gear, and K5600. There are a variety of types of HMIs, including open-faced (as in the M18 below), PARs, and Fresnels; the entire category can only be dimmed down by 50% and are **extremely expensive.**

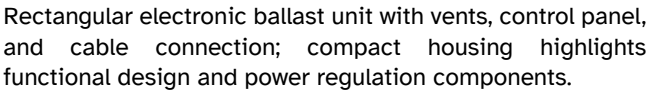


Open-faced HMI light with a circular reflector and central bulb, mounted on a yoke; the reflective interior and round housing emphasize a focused, directional beam.

Figure 5.9. Arri HMI M18 – 1800 watt – an open-faced HMI.

An HMI is not operated by plugging into an electrical circuit. Instead, an electrical arc creates two electrodes producing a gas.

To ignite and regulate the voltage and current, a ballast is needed. The ballast can be noisy, and older bulbs can flicker and have color variance. In addition, a special header cable connects the light to the ballast.



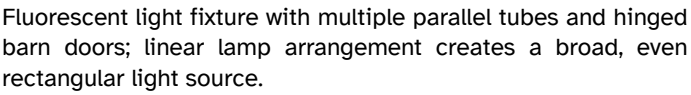
Rectangular electronic ballast unit with vents, control panel, and cable connection; compact housing highlights functional design and power regulation components.

Figure 5.10. Arri Ballast.

There are two types of ballasts: magnetic and electronic. The least expensive ballast is the magnetic one, but it can create a flickering effect. Electronic ballasts have a flicker-free mode but, unfortunately, can produce a squealing or buzzing noise. Some electronic ballasts have a silent mode that can reduce this and can stop flickering but are poor for high-speed frame rates.

Fluorescents

Found almost everywhere, fluorescent lights are akin to HMIs in that they use gas for illumination. An electrical current makes mercury vapor emit ultraviolet light. A phosphor coating on the tube translates the UV light into the visible spectrum. The tubes, particularly older ones, flicker and cast an unhealthy, ugly green hue on characters' skin tones. Kino Flo is the main brand manufacturer of fluorescent lighting in the industry. They require a ballast, just like HMIs. The light below uses four 55 W fluorescent lamps with an equivalency of 1,000 W.



Fluorescent light fixture with multiple parallel tubes and hinged barn doors; linear lamp arrangement creates a broad, even rectangular light source.

Figure 5.11. FloLight FL-220AWD Fluorescent Video Light with Wireless Dimming (5,400K Daylight).

Close up

Benefits of Fluorescents:

- relatively inexpensive
- very efficient, thus cost-effective
- minimum heat produced but not overly hot
- lamp life approximately 10,000 hours

Other features of fluorescents to consider:

- limited dimming capabilities
- color temperature tubes available in 5,500K and 3,200K

Types of Light Fixtures

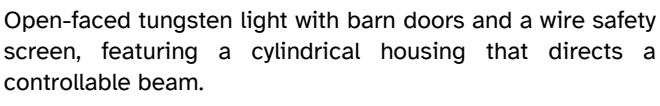
The following sections contain information regarding three main types of light fixtures: open-faced, PAR, and lensed light fixtures.

Open-Faced Light

This is the simplest form of electrical light, also known as an open reflector light, consisting of a filament inside a glass globe (bulb), housed in a metal casing, sitting in front of an aluminum reflector. It has a metal safety mesh at the front of the housing. There is no lens, no safety glass; it heats up very quickly, produces intense hard light, casts hard shadows (sometimes double shadows) on a subject, and is unable to focus or have any control over the spread of the beam of light.

Focus!

A light beam is a cone of light with a certain angular range that lights the area.

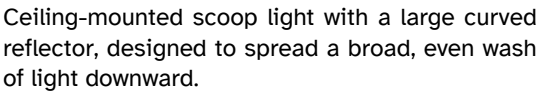


Open-faced tungsten light with barn doors and a wire safety screen, featuring a cylindrical housing that directs a controllable beam.

Figure 5.12. Redhead camera light.

Adding accessories, such as a barn door, can help control the beam. The above image is a Redhead (rather misogynistic nickname), also known as a Mickey, with an 800 W bulb, and it has barn doors for attaching gels and diffusion. Its beam is thrown in an even, light pattern. A blonde (a tad misogynistic) has yellow housing and uses 2,000 W bulbs.

Some open-faced lights have lenses, just like a closed-face lens (see PAR later in the chapter). However, since they are manufactured with the same configuration and an open-lensed fixture, they are still considered open-faced.



Ceiling-mounted scoop light with a large curved reflector, designed to spread a broad, even wash of light downward.

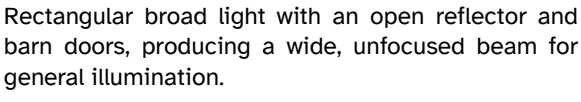
Figure 5.13. Scoop light.

Scoop

This is a simple, lightweight fixture also known as an Ellipsoidal Reflector Floodlight (ERF). It uses a tungsten halogen bulb housed inside a dome-like metal fixture and heats up very quickly. The metal acts as a basic reflector. Since it is open-faced there is no lens and it cannot be focused or controlled. It produces a wide, smooth wash and soft pool of light. Some scoops can throw light up to ten and twenty feet in diameter.

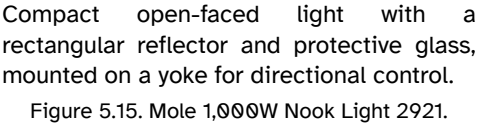
Broad

Not to be confused with the broad lighting technique, the Broad is a simple, no-nonsense, open-faced light. It consists of a box with a reflector and a double-ended bulb. It can come in assorted sizes, with the smallest version called a nook, mainly used as a fill or back light. Compact, efficient, and versatile, it has a rectangular beam pattern. The Broad usually has a 1-1.5k FCM or FHM bulb.



Rectangular broad light with an open reflector and barn doors, producing a wide, unfocused beam for general illumination.

Figure 5.14. Broad light fixture.

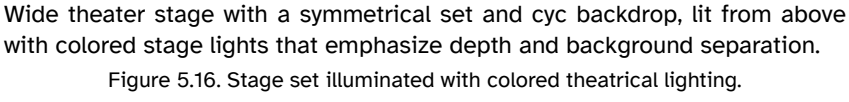


Compact open-faced light with a rectangular reflector and protective glass, mounted on a yoke for directional control.

Figure 5.15. Mole 1,000W Nook Light 2921.

Here is an example of a nook manufactured by Mole-Richardson that uses a 1,000 W bulb. It is called a nook since it can fit into small, tight areas. It is affordable, and the rectangular beam makes it easy to blend. However, it is hard to use and can get extremely hot.

Cyclorama Lights



Wide theater stage with a symmetrical set and cyc backdrop, lit from above with colored stage lights that emphasize depth and background separation.

Figure 5.16. Stage set illuminated with colored theatrical lighting.

Originally used for theatrical backdrops in the 1920s, these are more commonly known as “cyc lights.” Compact and sturdy, they provide an even wash of light and color, eliminating shadows across a large area. Cyc lights are used in live performances, concerts, film, and television, and come in a variety of types using tungsten and LEDs. They are particularly useful for lighting green screens due to the quality of shadowless uniformity of light (see more on green screen in Chapter 15).

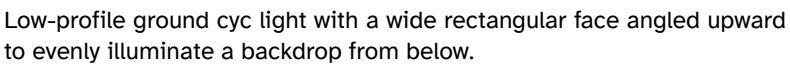

Low-profile ground cyc light with a wide rectangular face angled upward to evenly illuminate a backdrop from below.

Figure 5.17. Ground cyc.

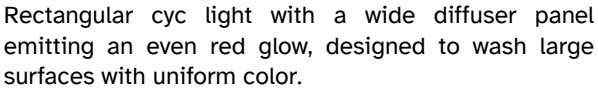

Rectangular cyc light with a wide diffuser panel emitting an even red glow, designed to wash large surfaces with uniform color.

Figure 5.18. Spectra cyc 50 – 50 Watts 100-240VAC.

Cycs can be placed anywhere, from low on the floor to up high on the grids and can have added color. Figures 5.17 & 5.18 are two examples.

Lowel Tota-Lite

Cinematographer Ross Lowell is credited with the invention of gaffer tape, found on every film set.

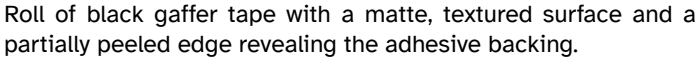

Roll of black gaffer tape with a matte, textured surface and a partially peeled edge revealing the adhesive backing.

Figure 5.19. Gaffer Tape.

However, Lowell also developed a special open-faced light. In the 1950s, as a cinematographer he was often frustrated with available lighting fixtures when location shooting. He was looking for a robust but portable lighting system. Consequently, with experimentation, he created a small socket on a ball swivel that could accept a floodlight.

In 1959, he started his Lowel-Light Company (now owned by Tiffen), developing a variety of open-faced fixtures. His Lowel Tota-light is also known as a “broad” because it casts light in an even, broad pattern. Compact, rugged, and versatile, this fixture can have an umbrella, gel, or diffusion attached to it for softer fill or backlight. With adjustable reflectors, it is good for bouncing light, background, and location work. It can be a smooth, even background light or can be pointed towards the ceiling to raise the ambient light.

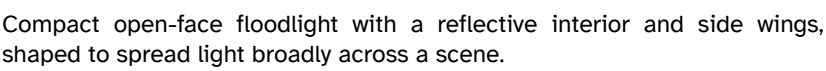

Compact open-face floodlight with a reflective interior and side wings, shaped to spread light broadly across a scene.

Figure 5.20. Lowel T1-10 Tota Light, Tungsten.

Omnilight

Also created by Lowel, this basic open-faced light is small, light, robust, powerful, and portable. It contains attachment plates for installing tools such as an umbrella and a reflector. Gel can be secured on the barn doors with small clips. The one below has a 500W bulb with a wire mesh for safety. It can be handheld using the rubber hand grip but also can be secured on a stand. It has a wide focusing range, so it can be used as a key or backlight.

Compact open-face floodlight with a reflective interior and side wings, shaped to spread light broadly across a scene.

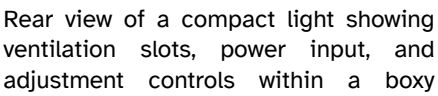

Rear view of a compact light showing ventilation slots, power input, and adjustment controls within a boxy housing.

Figure 5.21. Omnilight, front and back views.

Close up

Omnilight tips:

- It uses a tungsten bulb and generates heat, so you must be careful not to burn yourself. The rubber hand grip helps to avoid this type of accident.
- Do not touch the bulb without gloves if you need to change it. Because it is tungsten, the oils from your hands can cause the bulb to shatter and even explode.

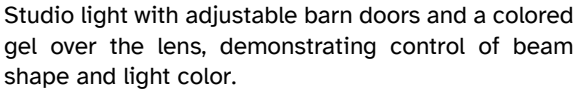


Figure 5.22. PAR light with barn doors, front view.

Barn doors with small clips for holding diffusion materials, along with gel holders, can be purchased and attached to the Omnilight. This gives it more versatility in the field. See the example in figure 5.22.

Parabolic Aluminized Reflector Lights

Parabolic Aluminized Reflector (PAR) lights are frequently used in spotlights, concerts, theater and stage lighting, shopping mall displays, exterior landscaping, car headlamps, and airport runways. It produces a directional beam of light and can have dynamic color effects added.

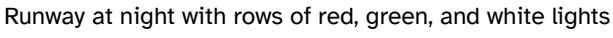


Figure 5.23. Airport PAR runway lights.

Classic PAR lights consist of a long, thin halogen filament inside a glass bulb protected by a metal housing called a PAR can. The reflector bowl and pressed lens inside the lamp refract light from the halogen lamp, providing directional lighting. The filament is long and thin, so it produces an oval beam rather than a circular one.

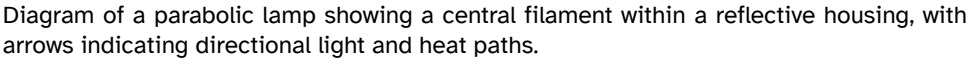


Figure 5.24. PAR lamp diagram

PARs can provide wash lighting, in other words, broad, even illumination across an area such as a stage. They can light an entire wall, ceiling, or floor with a soft flood or focused beam of colored light and are popular for events. By adding gels for color effects, they can create mood, time, and even era. They are also effective for highlighting or emphasizing essential elements or areas of a scene. Additionally, they can be used as backlighting to add depth and separate actors from the background. This fixture can also have a mounting bracket for bolting to a light bar or truss.

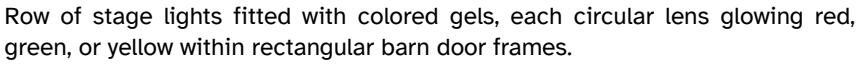


Figure 5.25. Classic PAR lamps with colored gels.

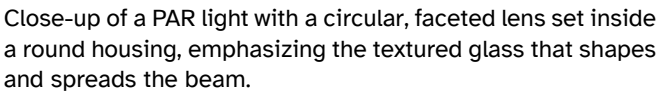


Figure 5.26. Exterior PAR light.

The parabolic mirror concentrates light output into different beam spreads, otherwise known as beam angles.

- clear lens: very narrow spot (VNSP).
- lightly textured lens: narrow spot (NSP); useful for distant object illumination.
- stippled lens: medium flood (MFL); spreads a broader beam than the VNSP.
- more pronounced stippled lens: wide flood (WFL); produces a larger spread of beam.

PARs come in a variety of shapes and sizes, from the minuscule PAR14 to the 1000W PAR64 cans. The PAR 64 VNSP 1200W moniker is “firestarter” due to the intense heat they produce.

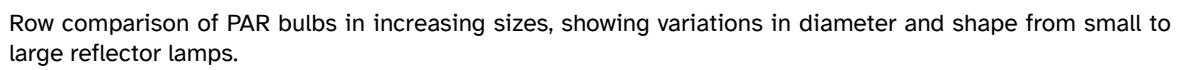


Figure 5.27. PAR diameter sizes.

The numbers are related to the size of their diameter, which is measured in 1/8th of an inch. A PAR64 is eight inches in diameter (64/8 = 8). PAR38 has a diameter of four and three-quarters inches (38/8 = 4.75). PAR16 has the nickname, Birdie.

Maxibrutes (**Molepars**) are banks of multiple PAR64 (1KW) lights and come in banks of 4, 6, 9, 12, or 24

PAR sizes

Name	Diameter
PAR14	14/8 = 1.75 inches
PAR16	16/8 = 2 inches
PAR20	20/8 = 2.5 inches
PAR30 long neck	30/8 = 3.75 inches
PAR30 short neck	30/8 = 3.75 inches
PAR36	36/8 = 4.5 inches
PAR38	38/8 = 4.75 inches
PAR46	46/8 = 5.75 inches
PAR56	56/8 = 7 inches
PAR64	64/8 = 8 inches

PAR lamps are also available in a variety of wattages and beam spreads. For example, a PAR56 lamp can be 300 or 500 W. Bulbs are also available in the four main beam spreads: VNSP, NSP, MFL, and in the four main beam spreads: VNSP, NSP, MFL, and WFL.

PARs are relatively inexpensive, simple, and versatile to use. In addition, the PAR38 is commonly sold at home improvement centers, so you can purchase one for last-minute emergencies. The PAR38's wattage (75 W–300 W) allows for several to be plugged into the same electrical circuit without concern of overload. However, it should be positioned 10-20 feet from your subject.

Line of stage-mounted PAR lights on a grid, each emitting a different color, forming a horizontal sequence of bright, colored beams.

Figure 5.28. PAR lights on grid.

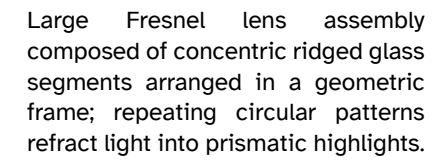
Today, PAR lights have been given a new lease on life due to the introduction of LED light sources. Compared to the heat-searing halogen filament, multi-colored LED PARs have ultra-long-lasting life cycles due to their energy efficiency and almost zero heat produced and consequently can be used for extended periods of time. The 1K PAR has a comparable output to a 10K watt! They can produce all the colors of the rainbow with the touch of a switch. They also allow for plastic housing and DMX (Digital Multiplex) control. DMX is a system allowing multiple fixtures to be affected by a single controller. It uses a data signal to control the intensity, color, and other parameters of LED lights. Since the PAR light has been around for so long, the name has just remained.

Lensed Lights: Fresnel's Ship-Saving Invention

Engraved portrait with dense crosshatching, emphasizing tonal shading and fine line texture across the face and clothing.

Figure 5.29. Augustin Fresnel.

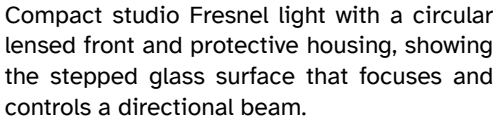
In 1823, French physicist Augustin-Jean Fresnel (pronounced *fray-nell*) experimented with a scaled lens prototype at the Phare-de-Cordouan lighthouse near Bordeaux, France. This lens magnified the lighthouse flames and assisted sailors to see during severe weather or at night. His system revolutionized modern lighthouse lighting, and the "Fresnel lens" is used in most lighthouses worldwide."[5] This "invention that saved a million ships."[6] It had a lens consisting of concentric rings of glass prisms bending the light from inside to create a long, narrow beam of high intensity much greater than the light source itself.



Large Fresnel lens assembly composed of concentric ridged glass segments arranged in a geometric frame; repeating circular patterns refract light into prismatic highlights.

Figure 5.30. Fresnel Lens at Point Arena Lighthouse Museum.

Fresnels have become the staples of television, movie, and photography studios. They come in a variety of manufacturers, light sources (tungsten, LED, and HMI), and sizes: from the small 100 W 2" LTM Pepper to the enormous 24,000 W I use Arri 150 W, 300 W, 650 W, and 1000 W Fresnels all the time in the studio. Fresnel lights come in different voltage rates, although the ones we use in class come with bulbs that have a voltage of 120V. They can be used as key, fill, back, rim, and eye lights depending on the wattage.



Compact studio Fresnel light with a circular lensed front and protective housing, showing the stepped glass surface that focuses and controls a directional beam.

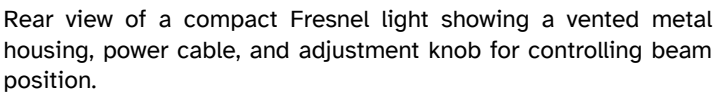
Figure 5.31. Arri Fresnel 650-watt tungsten light.

Close up

Tungsten Fresnel's come in the following wattages:

- 100 watts
- 150 watts
- 200 watts
- 300 watts
- 650 watts
- 1K (1,000 watts)
- 2K (2,000 watts)
- 4K (4,000 watts)
- 5K (5,000 watts)
- 10K (10,000 watts)
- 12K (12,000 watts)
- 20K (20,000 watts)
- 24K (24,000 watts)

Inside the Fresnel housing is a bulb positioned on a movable slider, called the sled. There is a round, black control knob at the back of the housing that allows the slider and bulb to move towards the lens. This spots the light, making it more intense and hard. Flooding the light by bringing the bulb back from the lens scatters the light, making it less intense and softer.



Rear view of a compact Fresnel light showing a vented metal housing, power cable, and adjustment knob for controlling beam position.

Figure 5.32. Back of Arri Fresnel 650.

At the rear of the housing interior, behind the sled, is a spherical reflector that directs most of the light toward the lens, which then focuses the light into a beam. The housing unit is designed to reduce and cool the sled, bulb, and reflector as tungsten Fresnels generate massive amounts of heat. There are brackets at the front of the housing to attach barn doors and hence control light spill. Gels and diffusion can be fixed to the barn doors with C-47s. There is also a rigging space for inserting scrims and gobo holders for gobos.

Main Components of a Fresnel Lens

- Fresnel lens: the primary element, a thin, flat piece of glass with concentric circular grooves.

- Lamp and reflector: the light source and its reflector, which directs light toward the lens.
- Sled: the mechanism that holds the lamp and reflector and allows for adjustment.
- Accessory bracket: this holds color filters and other accessories, such as scrims, in front of the lens.

Adjustment mechanisms:

- Tilt knob: adjusts the angle of the light beam.
- Screw feed crank: moves the lamp and reflector along the sled, changing the focus.
- Pan screw: adjusts the horizontal direction of the light.
- C-clamp: used to attach the fixture to a stand or other support.
- Yoke: a support structure that connects the lens to the clamp.

Figure 5.33 is a diagram showing the main components and adjustment features of a Fresnel lens.

Technical diagram of a Fresnel fixture with labeled components, including the lens, yoke, clamp, and internal lamp assembly, illustrating how the light is focused.

Figure 5.33. Fresnel with main components diagram.

Close up

Fresnel nicknames

- Inky: 100 watts
- Midget: 200 watts
- Tweenie: 650 watts
- Baby: 1K watts
- Junior: 2K watts
- Senior: 4/5K watts

Fresnel pros and cons

- durable, robust workhorse
- expensive, but it can last for many years.
- heavy, but newer models are getting lighter all the time.
- portable, especially if you buy a lighting kit in a rolling case.
- versatile: can produce a hard-edged beam of light that is great for shadows but also produce soft light
- uses a plethora of different light sources, sizes, and fixtures
- produces extreme heat and requires gloves when handling
- takes some time for lights to cool down, so unable to pack up immediately after a shoot
- different accessories can be added (barn doors, scrims, gels, etc.).
- produces harsh, crisp shadows when the beam is spotted; opposite when the beam is flooded
- Fresnel LEDs produce a more yellow color than tungsten Fresnel lights.

Compact on-camera light with a small circular lens and rounded housing, designed to project a focused beam directly forward.

Figure 5.35. Eye light fixture example.

Other forms of light

Catch light

A fabulous, mirror reflection of a light source seen in a character's eye is a catch light. Also called a highlight, eye light, or Obie light, it is meant to show a glint in the eyes. This sparkle gives life to your characters, and without it, a character seems dead, shallow, or evil. It can be as simple as using an accessory shoe to attach a tiny, low-watt lamp at the top of the camera and lens. It can be a small Fresnel, fluorescent, or LED. The key is not to add light to the face but just catch the reflection in the eye.

Eye lights have three basic settings: low, medium, and high, but each setting can be adjusted. To avoid overpowering other parts of the face, this light is intentionally dim and white in color.

Centered studio portrait lit with soft, even frontal light; smooth tonal gradation and minimal shadows emphasize facial symmetry and detail.

Figure 5.34. Merle Oberon the Obie.

Close up

The Obie is named after Merle Oberon, who was a British movie star in the Golden era of Hollywood. In 1937, she suffered facial scars due to a car crash. Seven years later, when filming *The Lodger*[7] Cinematographer (and later her husband), Lucian Ballard, created a small light to conceal her small scars. The light became known as the Obie light.[8]

Close-up portrait framed by a circular ring light, creating even frontal illumination and a bright halo that centers the subject.

Figure 5.36. Ring light.

Other eye lights can be more pronounced and distinctive, such as the ring flash/ring light (ring-shaped reflections), soft boxes, or even beadboard (large square or rectangle highlights).

China Balls

Also called Chinese lanterns or Jem balls, these circular fixtures look like a Chinese paper lantern except they are made with silk. Consequently, they can cope with the rigors of filmmaking, which a paper lantern would not be able to do. French cinematographer Philippe Rousselot pioneered their use. He mounted them on booms that allowed for a soft-moving source to follow actors. In an interview for *British Cinematographer*, Philippe Rousselot said, "Chinese lanterns allow me to throw very soft light on faces, with practically no lights in the background, so I can isolate the actor from the background."[9]

round paper covered light with a handle that allows it to be hung

Figure 5.37. China ball.

China balls come in 22-inch and 30-inch sizes and produce an incredibly soft, 360-degree light. They are great for soft top lighting, party scenes, and even eye lights. A wire frame connects to hooks inside the lantern, which holds a variety of globes to suit your requirements. This system can be rigged and put in place very quickly. Cheap and versatile, the lanterns are excellent for soft lighting of a room or multiple subjects.

Chapter Review

I have covered the most popular lamps used in the film industry. However, there are hundreds of other brands of lights with a vast range of sources, wattage, power consumption, and styles. As technology advances, I am sure there will be more for you to explore as you advance in your career.

Fresnel interactive exercise:

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Fill in the blanks exercise:

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Chapter 6: Controlling Light and Lighting Accessories

This chapter explores how to control where light falls on a subject and the lighting accessories that can help. Along with the functions, quality, and direction of light, contrast ratios, high-key and low-key lighting, and light metering are also outlined. For reducing light, we explore the exposure triangle and how to control light using your camera via apertures, ISO, shutter speeds, shutter angles, and lens filters. Lastly, there is an overview of accessories that control where the light is falling onto a subject, such as barn doors, snoots, black wrap, dingles, cookies, gobos, and the use of gels. Knowing how to use these tools allows you to control the mood and style of a shot.

Begin with these foundational definitions of how we talk about light:

- Source of light: the origin of the light, for example, the sun.
- Angle of light: the path the beam of light is following.
- Intensity of light: the amount of light emanating from the light source, or in other words the brightness.

Functions of Light

1. Creates mood, texture, and style.
2. Creates on-screen and off-screen space.
3. Creates time.
4. Enhances atmosphere.
5. Conceals or highlights details.
6. Creates meaning.
7. Develops character/plot/themes.

Dim interior room with stone walls and wooden beams, lit by strong daylight entering through a window at right; light creates bright highlights and deep shadows, revealing texture and depth across the space.

Figure 6.1. Using sunlight.

Light Contrast Ratio

The difference in intensity between the key light and fill light (the light and shadow) on a subject gives us the contrast. Rather than absolute levels, ratios describe how much brighter or darker one element of the image is to another and are written as two numbers, such as 2:1. Common ratios are 2:1, 4:1, and 8:1, giving a difference of approximately 2, 3, and 4 stops of light, respectively. The key light follows the lens setting. Hence, if the light meter reads f/2.8 on the brightest side of the subject, then the lens will be set on the same f/stop.

Focus!

Key light is the brightest light source that illuminates a subject. This can be the Sun or any other type of light source.

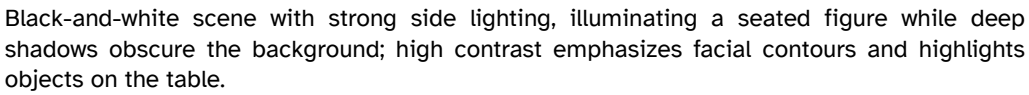
Fill light fills in the main shadows created by the key light on a subject.

The higher the ratio, the higher the contrast. An evenly-lit subject without much shadow has a 1:1 ratio.

Used in comedy, a ratio of 2:1 is high-key lighting. This means the key light is double the intensity of the fill light. It gives depth and dimension to a subject due to a moderate contrast between highlights and shadows and works well for a romantic, gentle feel for soft, delicate subjects such as children and babies. A ratio of 4:1 means the key light is four times the intensity of the fill light.

Bold, striking images are created when using an extremely high contrast ratio of 8:1. This time the key light is 8 times more

intense than the fill and is typically used in Film Noir (see Chapter 9, Film Noir and Production Case Study). This ratio creates dramatic dark shadows and bright whites, producing a moody and atmospheric feel.



Black-and-white scene with strong side lighting, illuminating a seated figure while deep shadows obscure the background; high contrast emphasizes facial contours and highlights objects on the table.

Figure 6.2. High contrast.

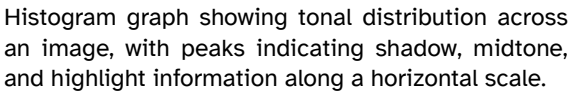
Measuring Ratios

To measure light ratios, you should determine the amount of light falling onto the subject from each light source. Using a light meter (see light meter as discussed above) is the most accurate method.

1. Take a reading of the key light.
2. Take a reading of the fill light.
3. Compare them.

If a key light reads f/8 and the fill is f/4, the ratio is 2:1.

You can also look at the histogram on the camera. A histogram is a graph showing different exposure levels, hence a general idea of the distribution of light and dark. However, it does not give you an exact measurement of lighting ratios, and when using an 8:1 ratio, it tells one very little except that it is very dark and very light. See Section J PowerPoints, Chapter 6 Histogram for more information on histograms.



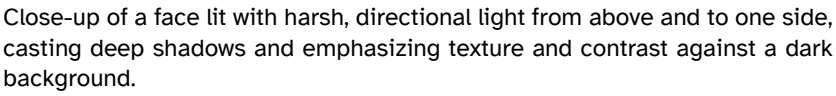
Histogram graph showing tonal distribution across an image, with peaks indicating shadow, midtone, and highlight information along a horizontal scale.

Figure 6.3. Histogram.

Whatever the ratios in a shot, the director of photography will aim to keep them for that scene. This is especially important when filming exteriors and at the mercy of the sun that is constantly moving. The sun is the strongest source of light that we can use. However, as it moves across the sky, the angle of its beams of light is always different. In the case of reshoots, knowing the ratios is helpful for matching shots that are sometimes completed weeks apart.

Quality of Light

Focus! **Inverse square law**: When you double the distance between a light source and a subject, you lose 75% of the brightness.



Close-up of a face lit with harsh, directional light from above and to one side, casting deep shadows and emphasizing texture and contrast against a dark background.

Figure 6.4. Cold soldiers, hard light.

Hard Light

It is important to determine what type of mood you are going for. Hard and soft light have qualities that help create mood as well as character.

Hard light casts distinct, strong shadows and can be very harsh and often unflattering, as it emphasizes skin imperfections and facial features. It is typically coming from a light source close to the subject in the frame, providing a stark contrast from dark to light tones. It can be incredibly beautiful too, for example, when using the Film Noir lighting technique. (See Chapter 9, Film Noir and Production Case Study.)

The shot above used one light, shone directly from above and slightly to the side of the main character. A reflector from the side,

but not too close to the subject, bounced light onto the face. Great care was taken to avoid bouncing light in the eyes. You can see how the character's face looks craggy with dark eyes, giving the impression that the character is mysterious and not a pure soul.

Close up

Hard light, like the sun on a clear day, streetlights, or car headlights:

- Dark shadows, sharp edges.
- Distinct highlights—harsh.
- Direct—emphasizes texture.
- Spotted—small area, intense.

Soft Light

Group of figures gathered in a dark, hazy setting, illuminated by soft, diffused candlelight; mist scatters the light to create a low-contrast glow, while selective highlights isolate faces and hands within a predominantly shadowed composition.

Figure 6.5. Soft light: *Among the Hemlocks*.

Soft lighting does not necessarily have to be darkly-lit like the shot above. It can be bright and lively and can work well for comedy or romantic genres. Soft light has an even spread of light and a gradual transition from light to dark and blended edges. This quality is more flattering to the subject, softening out skin blemishes and minimizing wrinkles. With the right diffusion and skin-colored gel, an older person can be made to appear much more youthful. The larger the light, the softer the light.

Direction of Light

The direction of light can come from the front, side, and back. Each of these main directions can also be from above, below, or at degree increments; for example, side lighting can be at a 45-degree angle falling onto a subject. The different paths that illumination takes have an enormous impact on an image, creating shadows, texture, depth, style, mood, genre, and how an audience reacts and finds meaning.

Wooden bench in a dim interior with a blue uniform draped across the seat; directional side light highlights fabric texture and metal buttons, while surrounding areas fall into deep shadow, emphasizing contrast and controlled illumination.

Figure 6.6. Direction of light on uniform.

Front Lighting

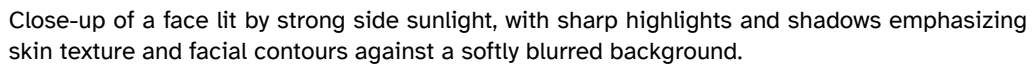
Light directly onto the subject tends to flatten out your subject, so care must be taken to ensure there is texture and/or depth to the image. Figure 6.7 has been lit from the front, but due to the texture on the ground, the position of the legs and hands, and the central sparkling gem, this is most definitely not a flat image. Instead, it is full of information.

Close up of hands holding a small ring.

Figure 6.7. High-Key front lighting: ring.

Side Lighting

Lighting that falls from the side lends more definition to the subject and enhances or disguises details by creating highlights and shadows. Consequently, the shot will have a three-dimensional quality. Look at figure 6.8 below that has been shot with natural sunlight and one reflector.

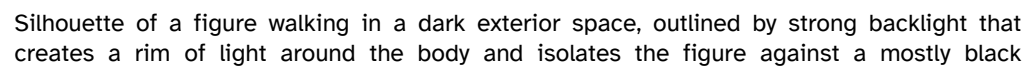


Close-up of a face lit by strong side sunlight, with sharp highlights and shadows emphasizing skin texture and facial contours against a softly blurred background.

Figure 6.8. Side lighting.

Back Lighting

Back lighting is used to separate the subject from the background. However, used on its own, without front or side lighting, back lighting can be extremely effective for creating silhouettes. This is discussed in more detail under Chapter 12, Three-Point Lighting and Four-Point Lighting.

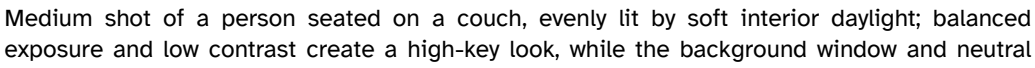


Silhouette of a figure walking in a dark exterior space, outlined by strong backlight that creates a rim of light around the body and isolates the figure against a mostly black background.

Figure 6.9. Cold Soldiers back-light.

High-key Lighting, Interior

This style is bright, with very little shadow or dark black. With low contrast ratios (such as 2:1), it is used to connote positivity, hopefulness, and optimism. It is often used in TV sitcoms, music videos, and for comedy or romantic comedy film genres. The shot below is from a short comedy.

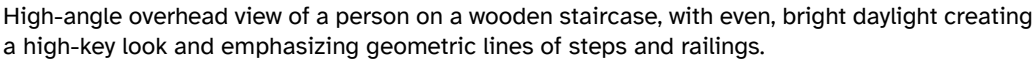


Medium shot of a person seated on a couch, evenly lit by soft interior daylight; balanced exposure and low contrast create a high-key look, while the background window and neutral tones keep the composition open and bright.

Figure 6.10. High-key lighting: interior.

High-key Lighting, Exterior

The shot below is just using sunlight streaming down onto the subject. It is bouncing off his white shirt, helping to illuminate his head, and showing the texture of his hair. The wooden stairs and handrails add texture and depth to the image.

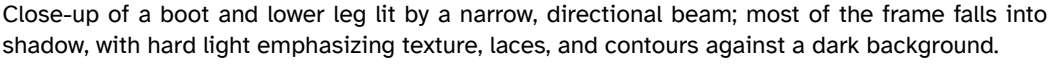


High-angle overhead view of a person on a wooden staircase, with even, bright daylight creating a high-key look and emphasizing geometric lines of steps and railings.

Figure 6.11. High-key lighting: exterior.

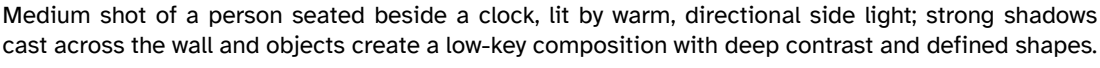
Low-key Lighting

Low-key lighting tends to use a hard source of light to create shadows with high contrast ratios, creating striking images. This can form an unsettling and dramatic mood. Once again, it is used in film noir (you can see more on this in Chapter 9, Film Noir and Production Case Study), but it is also used for horror, thrillers, or dark-themed dramas.



Close-up of a boot and lower leg lit by a narrow, directional beam; most of the frame falls into shadow, with hard light emphasizing texture, laces, and contours against a dark background.

Figure 6.12. Low-key lighting: boots.



Medium shot of a person seated beside a clock, lit by warm, directional side light; strong shadows cast across the wall and objects create a low-key composition with deep contrast and defined shapes.

Figure 6.13. Low-key lighting: drama.

Sunlight

A cloudy day creates soft, scattered, even light flattering subjects. However, when clouds are intermittent or non-existent, the sun is an extremely strong source of light, especially when it is high in the sky. It creates harsh shadows and can be very unflattering. As it moves across the sky, its beams of light are always at different angles, and the color temperature can vary.

However, you can use the different angles and colors to profound effect, but you must plan for it and be aware you are at its mercy. The “golden hour”—also known as “the hour”—is when the sun has the most beautiful, soft, flattering light. It occurs when the sun is beginning to rise or about to set.

The sun as a light source is covered in more detail in Chapter 7, Exterior Lighting—Day and Night.

Figures partially submerged in water in a wide horizontal composition; strong side sunlight creates high contrast on faces and gear, with reflections and ripples adding texture across the water’s surface.

Figure 6.14. Exterior sun direction.

Still life of a loaf of bread, metal pot, and cup arranged on a wooden table; bright side light from the right highlights textures while the background falls into soft shadow, creating depth and separation.

Figure 6.15. Almost still life.

Medium shot of a person at a table holding a bottle, lit by a single hard side light; high contrast isolates the figure and nearby objects against a dark background, emphasizing selective illumination and negative space.

Figure 6.16. 8:1 ratio lighting.

Action!

For figures 6.6-6.16 consider the following questions:

1. What compositional rule is this shot following?
2. Which direction is the light coming from?
3. Is there more than one light source in the image?
4. Would you say this is high-key or low-key lighting?
5. Is the light warm or cool?
6. What is the mood?

Accessories that Reduce Intensity of Light

Heavy-duty diffusion, such as silks, nets, and scrims, is discussed in more detail in Chapter 7, Exterior Lighting, Day and Night. The use of flags for negative fill and blocking light, as well as the use of reflectors, are also discussed in that chapter. However, laid out here are some of the terms you will find in Chapter 7 that relate to these accessories.

Close up

Flag—any device that blocks light. You can use black wrap as above, but, for light-blocking, specially designed flags and flag kits are available. Usually made of duvetyne, flags are heat-resistant and secured on a C-stand.

Floppy—a type of flag. A large, black, square tapestry made of duvetyne that is used for blocking out a light source. A floppy can be used to cut the light off of a certain subject or to black out an area for the director’s monitor.

Sider—a device that cuts the light from the side of a lighting unit, usually a flag. Sometimes called an ear.

Dots—small nets and flags used to control light.

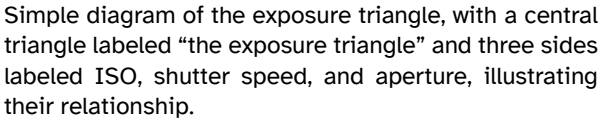
Fingers—narrow, rectangular in shape and sometimes called a blade or a cutter.

Toppers and Siders—flags that are placed at the top or side of a light source to reduce the light spill from that position.

Bottomer or Bottom Chops—A flag or cutter that is used to keep light off the floor or the lower part of a scene.

Reflectors—anything reflecting the light from the Sun or other light sources.

Bounce—a white, gold, or silver reflective object used to reflect softer light onto your scene.



Simple diagram of the exposure triangle, with a central triangle labeled “the exposure triangle” and three sides labeled ISO, shutter speed, and aperture, illustrating their relationship.

Figure 6.17. The exposure triangle.

Exposure Triangle

All cameras have three in-built elements to control light: the aperture, the ISO, and shutter speed/shutter angle. These three elements are called the exposure triangle and control how much light falls upon the camera’s sensor. We shall look at each of these in detail before moving on to advanced ways to control light.

International Organization for Standardization (ISO)

Measured as a numerical value, the International Organization for Standardization (ISO) controls the sensor’s sensitivity. ISOs of 50, 100, 200, 400, 600, 800, and above 800 are all commonly-used numerical values. Each increment doubles the light sensitivity. For example, an ISO of 400 is double the sensitivity of 200. The larger the number, the higher the sensitivity of the sensor and, hence, the brighter the image, but also the grainier the image. If it is a very sunny day, the ISO might have to be pulled down to 200 or 100. You should know what your camera’s sweet spot, aka native ISO, is. This would be found in the camera specifications in the manual or online from the manufacturer’s website.

See figure 6.18 below showing how light is affected by the ISO.

Horizontal chart showing increasing ISO values from low to high sensitivity; example images become progressively brighter and more grainy as ISO increases.

Figure 6.18. International Organization for Standardization

Understanding the ramifications of using ISOs that push a particular sensor’s sensitivity to its limit is important. For example, the Canon Rebel series has a sweet spot of 400 ISO. If you push the ISO up to 800, the image becomes noisy with graininess to the point of looking “nasty.” The RED Scarlett Dragon has an 800 sweet spot and can cope with pushing for more light above that. However, I have never needed to push an ISO above 800 since I adjust the lights or move the subject to a window with natural light and add reflectors instead. The URSA mini also has a native of 800, but I prefer to use 400, as I find that details in dark shadows are better. However, some cinematographers have other ideas and aesthetics regarding grainy images, and that is their prerogative. Canon’s Rebel series (SLI T6i, etc.) can produce some lovely shots when correctly exposed and composed, as you can see from a sophomore student’s video, *God Made a Farmer*.[1]

Action

Watch the student video, *God Made a Farmer:* www.youtube.com/watch?v=2w4xbijCRnc

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Aperture

The aperture is the opening in a lens that allows light to enter the lens and reach the camera sensor. Think of the aperture a bit like the pupil in our eyes, except our eyes are so much better than any camera lens. The larger the hole (aperture), the more light enters the sensor. The smaller the hole (aperture), the less light enters the sensor. The mechanism for controlling this aperture is called f/stops or T-stops, shown as f/. The sizes of the holes range from “wide open” at 0.8 to “closed down” at 32. Thus f/stops become marked as f/0.8, f/1.4, f/2, f/2.4, f/3.4, f/4, f/5, f/8, f/11, f/16, f/22, and f/32.

The hard part is remembering the numbers and what they equate with regarding how “wide open” or “closed down” the aperture becomes. The higher the number, the smaller the hole, while the smaller the number, the bigger the hole! Confusing, is it not? I have a mnemonic, BILL and SAM, to help me. The bigger the number, the less light. The smaller the number, the more light. So, if I have an f/stop of 2, this is wide open, allowing lots of light to enter the lens and onto the camera sensor. An f/16 is a narrow opening, and so less light can get onto the sensor. Look at the graph below, which provides some examples of f/stop sizes.

Aperture chart displaying f/stop values from small to large openings; circular diagrams widen from tight to open, with example images showing decreasing depth of field as aperture increases.

Figure 6.19. Aperture/f/stops

Using your aperture to get more light onto the sensor of the camera is called “opening up”, whilst reducing the light onto the sensor is called “closing down”. You can go up in one-stop increments using this graphic. At the end of this chapter is an exercise to practice your skill in controlling exposure. There are also interactive dialog cards to help with memorization.

Shutter Speed

The shutter speed is like a curtain that comes down in front of the sensor, either cutting out or letting light onto the sensor. The shutter speed is measured in thousands of a second: for example, 1/48th of a thousand of a second. The higher the denominator, such as 1/125, the faster the shutter speed and less light falls onto the sensor with the effect of darkening the image. The lower the denominator, such as 1/15, the slower the shutter speed and more light falls onto the sensor and the image appears lighter.

However, shutter speed affects motion inside the filmic frame. The slower the shutter speed, the blurrier the image is. The faster the shutter speed, the choppier the movement of the image.

Figure 6.20 is a shutter speed cheat sheet.

What different ISOs look like. Low Sensitivity is darker, but Higher Sensitivity includes more visual noise, i.e., splotches. The depictions progress from lowest to highest sensitivity: ISO 50, ISO 100, ISO 200, ISO 400, ISO 800, ISO 1600, ISO 3200, ISO 6400, ISO 12800, and ISO 25600.

Figure 6.20. Shutter speed.

The normal shutter speed is related to the frame rate. An easy way to remember it is to think about whatever the frame rate is, then double it, put a 1 over it, and add -th. So, 24 fps has a normal shutter speed of 1/48th. If there are 30 fps, then its normal shutter speed would be 1/60th. Similarly, if you have a shutter speed of 1/48th, then your normal frame rate would be half the denominator and remove the 1: in other words, 24 fps. Another example is if you have 1/60th, then the frame rate is 30.

Shutter Angle

Some cameras can be set to shutter angles or only use shutter angles, rather than shutter speeds (e.g., RED). The shutter angle is also relative to the frame rate. Think of the shutter as a circular disc, and certain angles allow the light to fall onto the sensor. Or imagine a full circular pizza without any slices. This is 360 degrees. When you cut slices out, you can have slices of 45, 90, 180, and 270 degrees. The larger the angle, the slower the shutter speed, and motion seems blurry. At the other extreme, the shutter speed can be made arbitrarily fast by decreasing the angle. A moving subject seems sharper, crisper, but also seems to stutter. This knowledge can be used creatively in movie making. In *Saving Private Ryan*, shutter angles of 45 and 90 were used to make images seem fast:

> ...Janusz came up with the idea of shooting with the shutter open to 45 degrees or 90 degrees, which completely negated any blurring. Often, when you see an explosion with a 180-degree shutter it can be a thing of beauty, but a 45-degree shutter looks very frightening.[2]

Diagram of shutter angles using circular segments and bars; larger angles correspond to longer exposure time while smaller angles indicate more light being blocked.

Figure 6.21. Shutter angles.

You can see in figure 6.21 how a 45-degree shutter angle blocks out a lot of light, whereas the 270-degree angle lets in a lot of light. For a frame rate of 24 fps, you would use the shutter angle of 180 degrees.

Close up

Here is a little cheat sheet for how shutter angle pertains to shutter speeds. You can see 180 degrees is the normal shutter angle for 24 fps.

Shutter speed reference

Shutter Angle	Shutter Speed
270	1/32
180	1/48
178.8	1/50
144	1/60
90	1/96
72	1/120
45	1/198
22.5	1/348
11	1/696
8.6	1/1000

If you want to do the math, then the formula for a shutter angle is:

frame per second x 360 degrees divided by shutter speed in thousands of a second

e.g., 24 fps x 360 degrees / shutter speed = 8640 / 48 = 180

Filters

When you are filming outdoors, or filming with outdoor light streaming through a window, it is difficult to obtain the correct exposure. This is where neutral density filters (ND) come in. They come in a variety of thread sizes and how much light can be blocked out, but they do not change the color of the light itself. Think of it like putting on a pair of sunglasses, except the filters are threaded onto the front of a lens, or using a matte box put in front of the lens.

Set of circular neutral density filters arranged in a row, their darkened glass surfaces demonstrating varying light reduction levels.

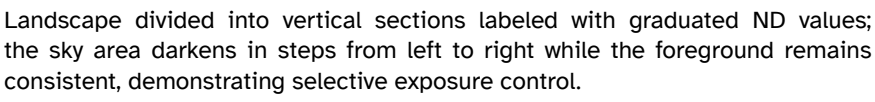
Figure 6.22. ND filters.

There is a plethora of brands, but I use Tiffen filters, and, although these are more expensive, the quality of the glass is in line with the expensive prime lenses that are used in digital filmmaking. This is particularly useful if you must maintain a wide aperture for depth in shallow field shots. Below is a chart showing how many f/stops the ND filter can block.

FIgure 6.23. ND filters in use: 1, 2 and 3 f/stops.

Neutral density graduated filters (ND grads) do the same thing, but instead of the whole filter being the same density, it is gradually decreasing. This means you can expose for the darker area in the shot whilst the brightest part has ND blocking out

some light. See figure 6.24 below. Notice how the grassy foreground has barely changed, but the sky is.



Landscape divided into vertical sections labeled with graduated ND values; the sky area darkens in steps from left to right while the foreground remains consistent, demonstrating selective exposure control.

Figure 6.24. Neutral density graduated filters compared.

There are a variety of ND graduated filters. Sunset grads give a yellow and orange tint, making it appear akin to a sunrise or sunset within the frame, without changes to other parts of the scene. A sunset grad can also enhance a colorless or hazy sky and can also be combined with other filters.

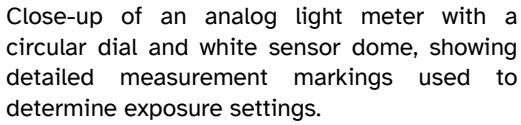
Twilight grads, meanwhile, add a deep magenta to pink gradient to skies and other bright areas of the frame.

Black pro mist creates a soft quality to the light. It reduces highlights and lowers contrast. For characters, it can soften blemishes and wrinkles.

Light Meter

Although camera monitors today have zebras, false color, and histograms for helping with exposure, a light meter has the precision and tactility of measuring the quantity of light falling on or off of a subject. Plus, it looks cool when someone is using it.

Meters can be analog or digital. I have an old analog in my drawer that still works after many years. Analog meters use a needle and are cheaper, but are not always accurate.



Close-up of an analog light meter with a circular dial and white sensor dome, showing detailed measurement markings used to determine exposure settings.

Figure 6.25. Analog Meter.

Digital meters use an LCD screen and are perfectly accurate but can be pricey. There are even digital apps to download that transform your phone into a light meter. These are good but not as accurate as the digital LCD ones.



A digital meter.

Figure 6.26. Digital light meter; often more affordable.

Why is a light meter needed?

- Detailed understanding of the light in a shot.
- Accurately assess correct exposure, particularly when filming exteriors.
- Accurately assess exposure when using filters.
- Ensure green or blue screens are correctly-lit (please refer to Chapter 15, Green Screen).
- Assist you when dealing with challenging conditions such as low lighting.
- Helps determine contrast ratios.
- Helps with continuity/consistency throughout shots in a scene, especially for moving shots.
- Eliminates vague terms such as darker, lighter.
- Cinematographers and DOPs can communicate specifics with gaffers and grips, e.g., hit a certain value and be fast and effective.
- Helps with planning and developing light plots.
- Gaffers and grips able to rig a scene before the arrival of the camera.
- Location scouts can check existing levels of ambient light in a particular place, which helps the DOP and cinematographer to understand how to best light the location. Saves time.
- For performing camera tests and wishing to assess the dynamic range of a camera.

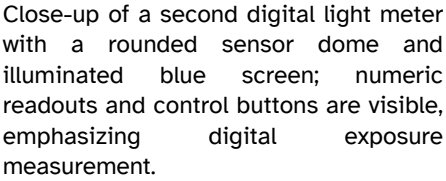


Close-up of a handheld digital light meter with a white spherical sensor dome and LCD screen displaying ISO, aperture, and time values; controls are arranged around the display for adjusting settings.

Figure 6.27. Small Sekonic light meter.

There are plenty of electronic light meters in the market and many more apps you can download to use on your cell phone. However, they all have the same purpose: to measure the amount of continuous light that either falls onto a subject, incident light, or reflects/bounces off of a subject (reflective light). Reflective light meters, also called spot meters, are typically used for taking readings off of small areas.

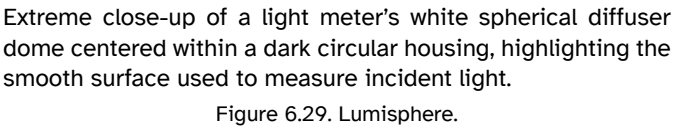
The meter in figure 6.28 (Sekonic brand) is the kind I use in class. For this meter, dial in the ISO and shutter speed and change the mode based on needs, such as if you are using flash photography. Once information is dialed in, the meter can be used to take readings.



Close-up of a second digital light meter with a rounded sensor dome and illuminated blue screen; numeric readouts and control buttons are visible, emphasizing digital exposure measurement.

Figure 6.28. Electronic light meter.

The round white globe is called the **lumisphere,** which measures the light; its shape enables readings to be taken at 180 degree angles. When the light meter is held up to the subject with the lumisphere facing the camera, it will record incident light. Be sure to not block any light with your body. Hold it close to the subject's face, and press down on the side button. The meter will give you the correct f/stop to use for the ISO and shutter speeds that you have set on the camera. When the meter has the lumisphere facing the subject instead, it will record reflective light. This measurement is often used when filming water shots and other highly reflective subjects.



Extreme close-up of a light meter's white spherical diffuser dome centered within a dark circular housing, highlighting the smooth surface used to measure incident light.

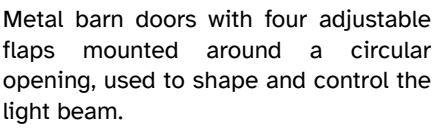
Figure 6.29. Lumisphere.

Accessories that Control Where Light Falls

The accessories below do not soften a light source. Rather, they are used to control light that is falling onto your subject or block light that is spilling from another light source.

Barn Doors

Barn doors are movable, metal flaps that attach to the front accessory holders of light fixtures. By controlling the direction of light, they can help create dramatic effects, shape light beams, and reduce unwanted light spill. You can bend each flap at an angle, open or closed, in various degrees to achieve the desired effect.



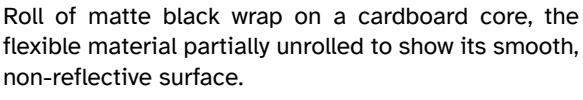
Metal barn doors with four adjustable flaps mounted around a circular opening, used to shape and control the light beam.

Figure 6.30. Barn doors.

It should be remembered that they only control where the light is specifically falling onto a subject; they do not diffuse light. Items such as diffusers and gels can be fastened onto the barn doors using C-47s (clothespins).

Black Wrap/Cinefoil/Photofoil

Using black wrap is a quick, inexpensive way to control light. It is made from black aluminum foil, with a matte coating on each side, and is used to block out light, control light spill, and eliminate unwanted reflections. It can even conceal items that are in shot but must be hidden, like imperfections on a piece of scenery. It is particularly useful in conditions of extreme heat and hence replaces other accessories that might burn.

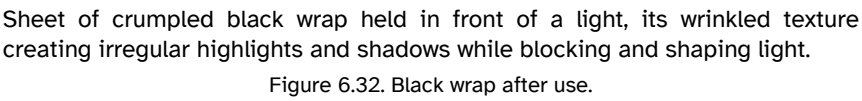


Roll of matte black wrap on a cardboard core, the flexible material partially unrolled to show its smooth, non-reflective surface.

Figure 6.31. Roll of black wrap

Lightweight and durable, it is heat-resistant and can keep its shape and position when wrapped around fixtures or hardware. It can be positioned in place with tape, staples, or adhesives. However, only C-47s should be used to affix black wrap to a light fixture.

Black wrap comes in rolls with different widths and lengths to accommodate your needs. With scissors, you can cut it into different patterns to create custom gobos, snoots, cookies, or flags and barn doors, and you can even reuse it.



Sheet of crumpled black wrap held in front of a light, its wrinkled texture creating irregular highlights and shadows while blocking and shaping light.

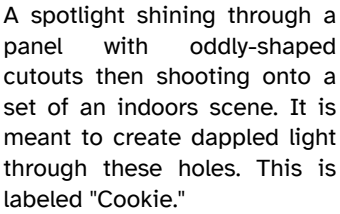
Figure 6.32. Black wrap after use.

Accessories that Create Patterns of Light

Using tools that can create patterns is useful. You can find dingles for free in the garden or purchase expensive cookies, but they all serve the same purpose: to give your scene some extra life and make it appear more realistic. As discussed above, cine foil can have patterns cut out and placed in front of a light source. However, below are some other accessories that you can use.

Dingle

I use dingles all the time. This is anything you may have found lying in your garden, particularly a tree branch, with or without leaves, that is placed in front of the light (not too close in case of fire). Someone can gently move it or vigorously shake it according to the mood of the scene (e.g., a gentle breeze or major storm). A dingle is the simplest and cheapest accessory that you can use.



A spotlight shining through a panel with oddly-shaped cutouts then shooting onto a set of an indoors scene. It is meant to create dappled light through these holes. This is labeled "Cookie."

Figure 6.33. A cookie in use.

Cucoloris or “Cookie”

More commonly called a cookie, this is an accessory that has a large pattern, usually carved out of wood. It is placed at a distance from a light source, and that can create similar patterns and shadows. It does need some grip rigging, such as a C-stand, knuckle, arm, and sandbags, to ensure it is placed securely. The large cookie in figure 6.33 is part of a kit that contains flags, dots, and bounce cards.

Cookies cut light into patterns formed by the cookie’s design. It can help create contrast as well as prevent the light from looking too fake. I love using these and have a portable wooden trellis from a hardware store that serves as a great cookie.

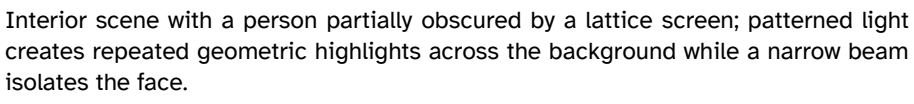

Interior scene with a person partially obscured by a lattice screen; patterned light creates repeated geometric highlights across the background while a narrow beam isolates the face.

Figure 6.34. Trellis and film noir.

Gobo

There has been speculation about the origins of the term “gobo.” Some have theorized that the term is a contraction of “go before optics” or “go between optics.”[3] Made of metal, it has specific stenciled patterns that can project shapes, shadows, textures, and images when placed inside a focusable fixture like a Fresnel.

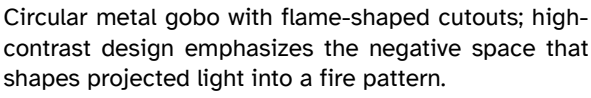

Circular metal gobo with flame-shaped cutouts; high-contrast design emphasizes the negative space that shapes projected light into a fire pattern.

Figure 6.35. Gobo fire stencil.

It is often used on set to project shadows, giving the impression of a set of window blinds, custom logos, or the outline of foliage. They create visual interest and depth to your shot. Gobos have a special holder that they are hooked into, and this is put onto the accessory plates on the light fixture.

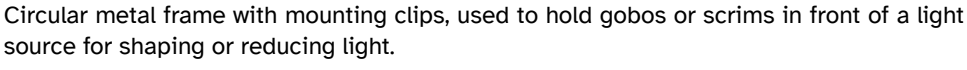

Circular metal frame with mounting clips, used to hold gobos or scrims in front of a light source for shaping or reducing light.

Figure 6.36. Gobo holder for Fresnel lamp fixture

This circular metal ring has small hinges that open up, creating two circles. You place the gobo in-between the circles and close it shut, securing it with the hinges.

Snoot

A snoot is also called a top hat and is made of PVC. Attached to the end of the light, it modifies the beam into a focused spotlight. It is commonly cylindrical or circular in shape and can come in different lengths and diameters. It is great for highlighting detail or adding a dramatic look. Some snoots come with a honeycomb modifier grid that can reduce some of the intensity of the light.

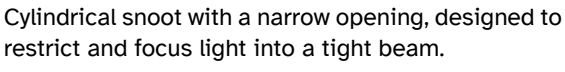

Cylindrical snoot with a narrow opening, designed to restrict and focus light into a tight beam.

Figure 6.37. Snoot.

Gels

The use of colors to change the light beams was used as far back as Shakespeare’s time. Red wine in a glass container gave way to the use of dyed gelatin material. Today, gels are made from thin, heat-resistant plastic and come in a wide range of colors and manufacturers. They are used to create an overall color aesthetic, diffusion, and color correction. They are denoted by name and sometimes a number designation from brands like Rosco. They can be bought in rolls or square sheets and cut to fit your lamp fixtures.

Gels can be split into four primary areas of use:

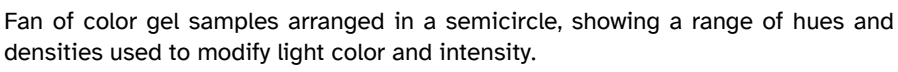
1. color gels (for style, mood, and atmosphere)
2. correction gels for mixed lighting
3. correction gels for skin tone
4. neutral density gels (to reduce intensity of light sources)

Colored Gels

With dozens of different colored gels available, you can choose orange gels that create warmth and sunshine or blue gels that create bitter winter or moonlight. Visual storytelling can be enhanced with the simple use of these gels. Make sure your camera

kelvins are set to the correct indoor (or outdoor) values of your key light to get the best results.

Gels can come in a variety of strengths, including full, half (½), and quarter (¼) gels. Most gel manufacturers have a swatch that shows all the gel colors (and diffusers) they have.



Fan of color gel samples arranged in a semicircle, showing a range of hues and densities used to modify light color and intensity.

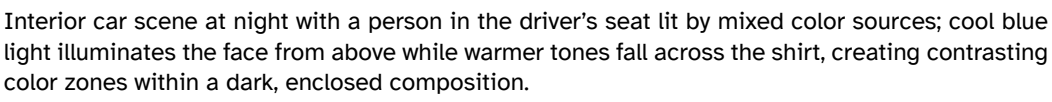
FIgure 6.38. Gels swatch.

Color Correction—Mixed Color Temperature

In shots that have mixed color temperatures, such as if you are shooting interiors that have daylight flooding through a window, then a color temperature blue gel (CTB) can be attached onto the interior light fixture(s). This CTB brings up the tungsten light fixtures to match the outdoor light temperature. This is quick and easy to do.

The more convoluted way is to bring the outdoor temperature down to the interior lighting fixture by using a Color Temperature Orange (CTO). This involves covering the whole window with the CTO. If the window is supposed to be in the shot, care must be taken to ensure the gel is noticeable.

Of course, you can use mixed color temperatures for effect. Take a look at this car shot in figure 6.39 below. Can you see how the mixed lighting has been deliberately used to create a dark, cold exterior versus the warmth inside the car?



Interior car scene at night with a person in the driver's seat lit by mixed color sources; cool blue light illuminates the face from above while warmer tones fall across the shirt, creating contrasting color zones within a dark, enclosed composition.

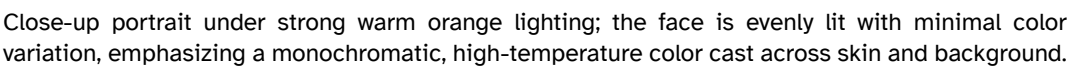
Figure 6.39. Mixed car lighting: interior and exterior.

Color Correction—Skin Tones

Sometimes actors' skin tones may appear too pale on camera. Using some gels, such as "Bastard Amber," can give a really flattering effect to skin tones and diminish blemishes and wrinkles.

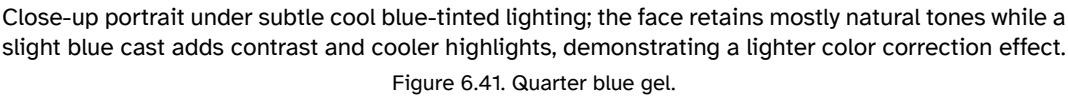
A magenta gel, also called a "minus green," can be used to cut out green tinges from light fixtures that cast ugly green hues onto subjects, particularly when skin tones look ghastly. I like the magenta on certain brownish colors, as it gives a richer tone.

Look at the difference between the shots in figure 6.40 and 6.41. The color temperature has changed the mood and the character completely.



Close-up portrait under strong warm orange lighting; the face is evenly lit with minimal color variation, emphasizing a monochromatic, high-temperature color cast across skin and background.

Figure 6.40. Orange gel.



Close-up portrait under subtle cool blue-tinted lighting; the face retains mostly natural tones while a slight blue cast adds contrast and cooler highlights, demonstrating a lighter color correction effect.

Figure 6.41. Quarter blue gel.

Neutral Density Gels

These ND gels act in the same way neutral density filters work on the camera lens, except these ND gels are attached to the light fixture with C-47s. They reduce the intensity of the light source without any change in the color temperature. They come in values of full, half, and quarter strengths and are especially useful if you must balance different light fixtures or want to reduce a particularly bright source, such as the sun.

They are especially useful if you attach them to a window, as they allow for the correct exposure inside the room without the dreadful overexposure that occurs from daylight.

See the image below, and notice how there is no ND on the window, so it looks blown-out. Yes, the crew was still setting some lights at the time, but they did not fix this overexposure on the window. Some filmmakers insist on **not** using ND and feel it

is an aesthetic choice. For me, I think the extra five or ten minutes spent on affixing the gel would be worth it to provide a more attractive shot. There are better ways to make a window look blown-out but aesthetically-pleasing, such as using silk over a window.

Behind-the-scenes interior showing a small film crew around a table; multiple lighting fixtures and stands are positioned near windows, with practical daylight mixing with controlled artificial light sources to shape the scene.

Figure 6.42. No ND on window.

You should spend time practicing your skills using all these different tools to control your light. Start with honing your camera exposure skills and then work on the simpler accessories on your lights.

Practice using your light meter. Set up a shot and play with the colored and neutral density gels.

Move on to experiment with dingles you have found in the yard. Try out some cookies, snoots, and gobos. If you do not have these, use some black wrap to fashion patterns. I have even used a tennis racket in front of a light to create a lovely texture on the back wall. Just make sure you do not have flammable items too close to the lamps.

With so many tools at your disposal, you will soon be able to manipulate light and shadow to create stunning, memorable images, taking your visual storytelling to a new level.

Group of figures arranged in a wide, symmetrical composition, strongly backlit through haze; bright overexposed light spills from the left, creating silhouettes and soft halos around figures holding lanterns.

Figure 6.43. Studio interior: night temperance women.

Chapter Review

Dialog Cards

Interactive Content

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Quiz: f/stops

Aperture chart displaying f/stop values from small to large openings; circular diagrams widen from tight to open, with example images showing decreasing depth of field as aperture increases.

Figure 6.19. Aperture/f/stops

Look again at the aperture graph in figure 6.19 above. I am using an f/stop of 5.6:

1. I wish to open up for more light. Which f/stops can I use?
2. I wish to close down for less light. Which f/stops can I use?
3. I am using an f/2 and wish to open up by ONE STOP. Which f/stop do I use?
4. I am using an f/22 and wish to open up by ONE STOP. Which f/stop do I use?
5. I am using an f/8 and wish to open up by TWO STOPS. Which f/stop do I use?
6. I am using an f/8 and wish to close down by TWO STOPS. Which f/stop do I use?

Crossword

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Review

Interactive Content

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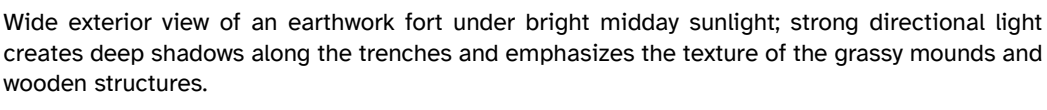
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Chapter 7: Exterior Lighting, Day and Night

The ability to work outdoors with natural lighting is a skill not to be underestimated. Dealing with the most powerful, movable key light ever used—the sun—is a constant challenge. This chapter outlines the three main techniques used to control sunlight: diffusion, reflection, and flags. These can harness and limit the power of the sun. How and when to use the tools needed for these techniques are explored in this chapter. There are tips for filming different skin tones, and, finally, how to light at night or shoot "day for night" shots is also covered in this chapter. If you can master these, you can transfer your skills for interior lighting.



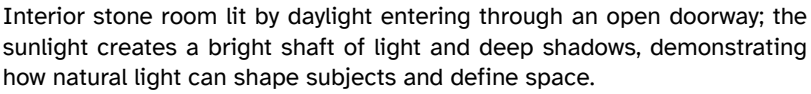
Wide exterior view of an earthwork fort under bright midday sunlight; strong directional light creates deep shadows along the trenches and emphasizes the texture of the grassy mounds and wooden structures.

Figure 7.1. Sunlight in long shot.

Controlling Sunlight

Chapter 6, Controlling Light and Lighting Accessories has information on how to control light using the exposure triangle (and monitoring it with a light meter), neutral density filters, direction of light, high- and low-key lighting, the use of black wrap, barn doors, snoots, cookies, and gels. However, even these methods cannot fully control our strongest source of light that we can harness. Diffusion, reflectors, and flags become our other tools in our lighting box. You can also use these for indoor lighting. Diffusers soften light in a shot; reflectors bounce light onto subjects, and flags block unwanted light. Based on where the sun is in the sky (time of day) and what effect you want, you can strategically position your subject and your control tools to effectively use natural light.

One of the easier ways to control sunlight is by shooting in the natural shadows. Look at the shot below and see how the harsh midday sunlight can be seen in the background, but the shadows are light enough to softly illuminate the subject (the drummer boy and lady).



Interior stone room lit by daylight entering through an open doorway; the sunlight creates a bright shaft of light and deep shadows, demonstrating how natural light can shape subjects and define space.

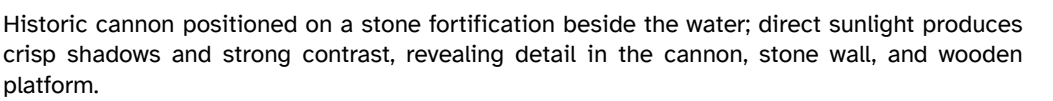
Figure 7.2. Using natural shadows.

Close up

More on color temperatures & natural lighting:

- The sunlight is extremely hot.
- The color temperature is blue.
- Color temperature varies from 5,800 Kelvins to over 20,000 Kelvins depending on if it is rainy, cloudy, or a bright snowy day (e.g., 5,800K to 20,000K).
- Different times of day provide different color temperatures:
  - Sunset/sunrise, or "golden hour" has a golden glow.
  - Twilight is ghostly blue.

Sun as the Key Light



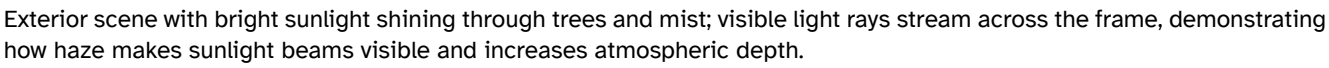
Historic cannon positioned on a stone fortification beside the water; direct sunlight produces crisp shadows and strong contrast, revealing detail in the cannon, stone wall, and wooden platform.

Figure 7.3. Cannon in sunlight.

You can film during golden hour when the sun is near the horizon. The beautiful, warm hue lighting effects are soft, flattering

for subjects. However, the timeline for this does not last very long—twice a day for about an hour, just at sunrise and just before sunset.

Depending on the weather and season, if you start shooting about 50-60 minutes around sunrise, you can capture beautiful light. The shot below was a misty morning just as the sun was rising.



Exterior scene with bright sunlight shining through trees and mist; visible light rays stream across the frame, demonstrating how haze makes sunlight beams visible and increases atmospheric depth.

Figure 7.4. Sunrise golden hour shot.

Diffusion

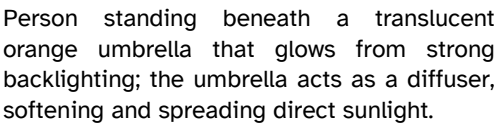
Diffusion materials filter sunlight and other light sources. Common materials are silks, lace, voile, sheer curtains, or similar fabrics, used to soften and reduce the intensity of harsh sunlight. This reduction and balancing of the contrast ratio create a flattering effect on your talent. They are also less likely to squint (unless you want them to do this, of course). If you are using sunlight to shine through a window, sheer curtains can serve as the set dressing as well as act as a diffuser. Diffusion fabrics are manufactured from synthetic materials and are more durable than natural materials such as China silk.

Close up

Choosing a Diffusion Fabric

- Size: If you are diffusing a large area, it might be more cost-effective to purchase fabrics on a roll, such as muslin or magic cloth.
- Durability: Some materials are manufactured to be less flammable and withstand a lot of heat without turning a different color.
- A shift in color temperature: Some materials will shift the color temperature of the light.

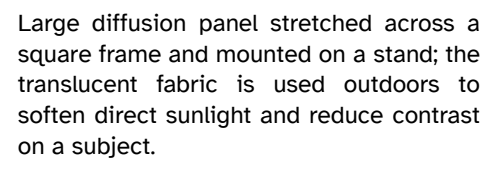
You can hang diffusion material over the arm of a C-stand. Make sure the diffusion covers your subject adequately and do not forget that the light direction will change rapidly, so you must work quickly. You can even use a simple rain umbrella as part of the subject's costume to diffuse the sun.



Person standing beneath a translucent orange umbrella that glows from strong backlighting; the umbrella acts as a diffuser, softening and spreading direct sunlight.

Figure 7.5. Umbrella used for diffusion.

Diffusion fabric comes in varied sizes and thicknesses. The one shown in figure 7.6 is a small one, 3 x 3 feet. Panels of diffusion measuring 6 x 6 feet ("six by" as it is often referred to) and mounted vertically to standard frames are called butterflies. You can hang your diffusion material to a frame and position the fabric between the sun and your subject, such as above or to the side of your subject. The material scatters the sunlight, softening it and, hence, making it less harsh.

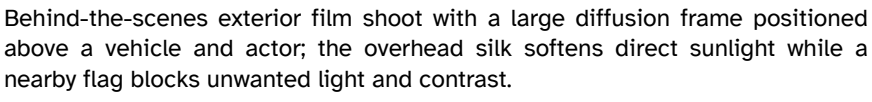


Large diffusion panel stretched across a square frame and mounted on a stand; the translucent fabric is used outdoors to soften direct sunlight and reduce contrast on a subject.

Figure 7.6. Diffusion on a 3′ x 3′ frame ("three by").

Covering a large area, framed diffusion can come in assorted sizes, such as 8′ x 8′ (eight by), 12′ x 12′ (twelve by), and 20′ x 20′ (twenty by), and are called overheads. Some of them are so big that they can cover a sound stage ceiling. They are collapsible for easy transport and quickly put together. Butterflies can be mounted onto one frame, a highboy, whilst the overheads require two highboys.

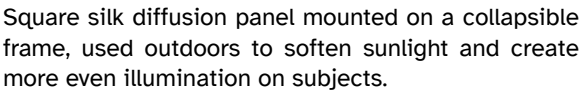
The shot in figure 7.7 has an “eight by overhead.”



Behind-the-scenes exterior film shoot with a large diffusion frame positioned above a vehicle and actor; the overhead silk softens direct sunlight while a nearby flag blocks unwanted light and contrast.

Figure 7.7. Overhead diffusion.

Another option is a flame-retardant, artificial silk; silk that is manufactured nylon or polyester. Figure 7.8 shows an example, featuring the gold color on the rim denoting a half silk (in other words, it reduces light intensity by one stop).



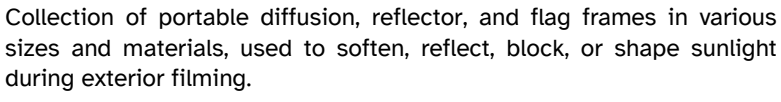
Square silk diffusion panel mounted on a collapsible frame, used outdoors to soften sunlight and create more even illumination on subjects.

Figure 7.8. Mathews artificial silk, B&H.

China Silk

This is a natural, translucent, lightweight silk that has a medium diffusion effect when used against the sun. It does not exceed 2 stops of diffusion and is more for directional lighting since it can shift the light.

Portable Kits



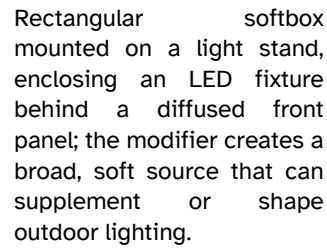
Collection of portable diffusion, reflector, and flag frames in various sizes and materials, used to soften, reflect, block, or shape sunlight during exterior filming.

Figure 7.9. Portable scrim and flag kit from B&H.

There are a variety of kits available containing different silks, scrims, and flags. The one below contains a 1/2-stop black single net, a 1-stop black double net, and a black light blocker. A 1-stop and a 2-stop silk diffuser are also included in this size. You can see in the image below there are two circular dots and two rectangular fingers. Please see the section “Dots and Fingers” for more discussion on these.

Magic Cloth

This cloth creates incredibly soft diffusion, usually purchased as a roll of fabric and available in overheads and butterflies. It is often used in soft boxes.



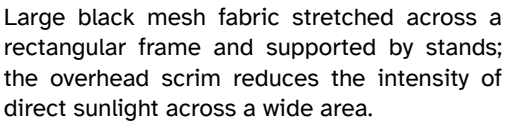
Rectangular softbox mounted on a light stand, enclosing an LED fixture behind a diffused front panel; the modifier creates a broad, soft source that can supplement or shape outdoor lighting.

Figure 7.10. Soft Box.

Soft Box

Using an incredibly soft fabric, usually magic cloth, soft boxes extend harsh, bright lights to create diffused illumination for beautiful settings.

Grid Cloth

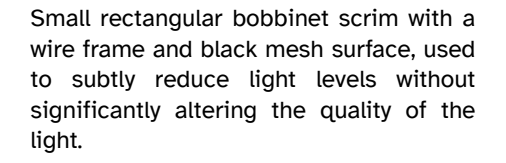


Large black mesh fabric stretched across a rectangular frame and supported by stands; the overhead scrim reduces the intensity of direct sunlight across a wide area.

Figure 7.11. Grid cloth.

A grid cloth is a waterproof material that has a grid pattern sewn into it. The cloth has a variety of degrees of diffusion relating to stops: ½, ¼, ¾, 1, 2, etc. If the cloth is 1 stop, diffusion is 50%; if it is 2 stops, it is 25%, etc. These are also referred to as full grid, half grid, quarter grid, etc.

Bobbinet



Small rectangular bobbinet scrim with a wire frame and black mesh surface, used to subtly reduce light levels without significantly altering the quality of the light.

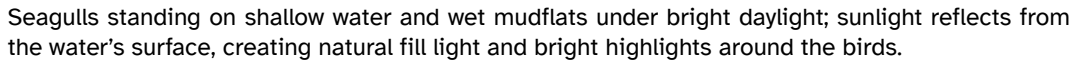
Figure 7.12. Bobbinet with double layer.

A flame-retardant net fabric, a bobbinet comes in assorted colors, such as black, white, and lavender. I use the black nets that come in a single layer (green rim) and a double layer (red rim). These bring down the intensity of the light: a single is 1/2 stop, and a double is 1 stop. The less-common lavender nets bring down the intensity by ¼ stop or less.

Bobbinets also have open-ended framing, meaning one side does not have a webbing or rim. This means that there is a smooth transition from the end of the bobbinet, and there is no noticeable harsh demarcation line or shadow cast on the subject.

Reflection

Anything that can reflect light onto a subject creates softer edges. There are various tools that are effective in this, such as specially made white cards and beadboard. Other items such as mirrors, white walls, water, and even puddles can all reflect light.

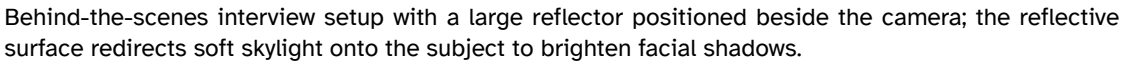


Seagulls standing on shallow water and wet mudflats under bright daylight; sunlight reflects from the water's surface, creating natural fill light and bright highlights around the birds.

Figure 7.13. Puddles as reflector.

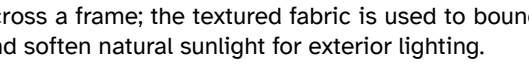
Reflectors will bounce sunlight onto a specific area in the shot. You can see how the icy puddles reflect the seagulls in the photo above. However, you are at the mercy of the sun's progression in the sky.

However, manufactured reflectors can give you more control. If you position reflectors opposite the sun, they can be used as a fill light. By redirecting the sunlight, reflectors can also illuminate backgrounds to create a sense of depth.



Behind-the-scenes interview setup with a large reflector positioned beside the camera; the reflective surface redirects soft skylight onto the subject to brighten facial shadows.

Figure 7.14. This reflector is bouncing sunlight from a skylight.



Close-up of a white muslin reflector surface stretched across a frame; the textured fabric is used to bounce and soften natural sunlight for exterior lighting.

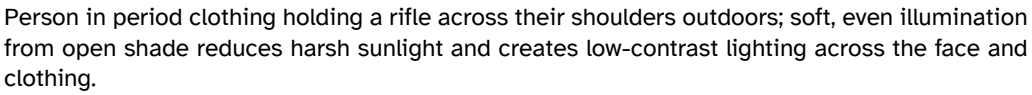
Figure 7.15. Muslin cloth.

Manufactured reflectors come in diverse sizes and materials, such as white cardboard. Spring-loaded reflectors can fold up and come in white, silver, and gold. The reflector in Figure 7.14 is using the silver side, but the other side is gold. I particularly like the gold one, as it provides a warm glow to skin tones.

Muslin fabric is highly effective for reflecting light across a set. Unbleached muslin is good for warmer tones of light.

Book Light

A book light is the term for any light source that bounces light off a reflective surface and diffuses it before it reaches the subject. The reflective surface can be as simple as a white shirt or or a mirror. Using a gold reflector board to bounce light onto the character created this natural, 18th-century mood in the shot below.



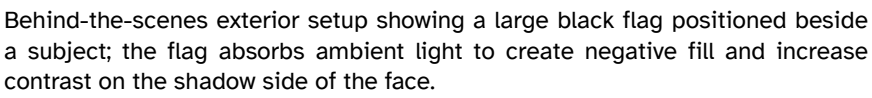
Person in period clothing holding a rifle across their shoulders outdoors; soft, even illumination from open shade reduces harsh sunlight and creates low-contrast lighting across the face and clothing.

Figure 7.16. Trevor with rifle lit with a gold reflector board.

Blocking Light

Flags

Flags are nicknamed solids or black solids, since no light can pass through them. This contrasts with nets, since a certain amount of light passes through them. Flags block unwanted sunlight, other light sources, and harsh shadows from falling onto specific areas in your shots. They are usually mounted on a stand and made from black, lightweight fabric, plywood, or polystyrene/beadboard. They vary in size from a few inches to massive flags mounted on cranes.



Behind-the-scenes exterior setup showing a large black flag positioned beside a subject; the flag absorbs ambient light to create negative fill and increase contrast on the shadow side of the face.

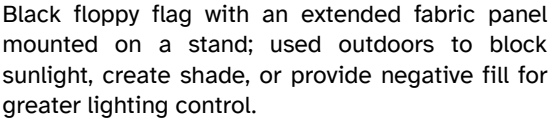
Figure 7.17. Flag example.

The positioning of flags can be used for different effects. If you move the flag away from the light, you will create a sharper demarcation line. Moving it closer to the light creates a gradual cut.

Many fabric flags are made from duvetyne, which feels velvety to the touch and is sometimes called commando cloth.

Focus! **Topper, bottomer, sider**: These are names for flags placed at the top, bottom, or side of a light source to reduce the light spill from that position.

Production Designer Richard James worked on the original Star Trek series.[1] He was working with the production crew to create "star fields on black duvetyne with painters spraying on 3M mastic and throwing on the glitter, then taking a broom and knocking some off."[2]



Black floppy flag with an extended fabric panel mounted on a stand; used outdoors to block sunlight, create shade, or provide negative fill for greater lighting control.

Figure 7.18. Floppy example.

Floppies

Floppies are flags with extra fabric that can flop down if needed. Some are attached using Velcro.

Dots and Fingers

Dots and fingers are tools used to control light in specific areas of a shot. A dot is small and circular, while a finger is narrow and rectangular in shape (like our own hand digits). A finger is sometimes called a blade or a cutter. Dots and fingers can be made with silk, scrim, or flag fabric.

Collection of grip-arm attachments holding circular and rectangular flags, including dots and fingers, mounted on articulated arms used to block, reduce, or shape small areas of light.

Figure 7.19. Dots and fingers examples.

These items are used to block light in specific areas and help fine-tune your lighting manipulation. They are often part of a larger kit (as seen in the portable scrim and flag kit B&H in figure 7.9) but can also be a stand-alone kit called a dot and finger kit.

Dots and fingers are particularly put to effective use when filming close-ups and, depending on their fabric, can create subtle shadows or enable small areas in the shot to be highlighted. They can also block unwanted reflections, especially from shiny objects, in a shot.

Black Wrap/Cinefoil/Photofoil

Roll of matte black wrap partially unrolled to reveal its flexible, nonreflective surface; the material is used to block, direct, or shape light on set.

Figure 7.20. Blackwrap.

As discussed in Chapter 6, Controlling Light and Lighting Accessories, black wrap is made for set lighting and is a flame-retardant, matte black foil made from aluminum. It comes in rolls of various widths (12, 24, 36, and 48 inches) and can be cut off in various lengths and placed on a light fixture using barn doors. You can transform sheets into various shapes to give you a cheap gobo or use them for creating negative fill (see below).

Negative Fill

Also called neg or neg fill, negative fill is a technique used to reduce the intensity of light reflecting or falling onto the shot or subject. Any material that is black, such as flags and black wrap, will absorb the light and create soft shadows.

A negative fill tool is usually applied to the camera side (the broad side) of the talent; hence, the other side (the short side) will remain brighter. This application creates a three-dimensional effect, shaping the subject in the shot. This technique is more common for outdoor lighting but can be just as useful for interiors, especially if light-colored sets are causing light to bounce all around.

Behind-the-scenes exterior film shoot with a large black fabric flag positioned near the camera and subject; the flag absorbs ambient light to create negative fill and increase contrast in daylight conditions.

Figure 7.21. Duvetyne flag used for negative fill.

Behind-the-scenes exterior filming setup with a large black overhead flag positioned above a vehicle and actors; the flag blocks ambient skylight to create negative fill and increase contrast in direct sunlight.

Figure 7.22. Another negative fill example visible on the left-hand side.

The shot in figure 7.23 needed two large floppies (12’ x 12’) to control the bouncing light from the sun and the white car.

Person seated inside a vehicle during an exterior shoot, with the shaded interior creating deeper shadows and greater contrast than the sunlit surroundings; negative fill helps define facial features while controlling reflected daylight.

Figure 7.23. Controlling the sun reflecting off the car.

Fog and Mist

Fog and mist also scatter light, softening it and creating different atmospheres. Natural mist and fog can be used, but if the weather is not complying, I love using the fog machine, as it is a lot of fun and creates fabulous atmospheric shots.

Group of figures carrying lanterns in a fog-filled exterior setting; haze diffuses and scatters the light, softening contrast and making beams and highlights visible within the scene.

Figure 7.24. Fog machine softening the light.

Close up

The fog machine can be used in daylight as well as inside. Controlling the intensity of the fog is often difficult, and care should be taken when using fog.

Please see Chapter 2 for SOS fog machine safety.

Filming Different Skin Tones

When filming for skin tone, the key is to prioritize proper lighting, accurate white balance, and exposure settings to ensure all skin tones are captured naturally and realistically, avoiding overexposure or underexposure. One should utilize techniques like diffusion to soften harsh shadows and achieve a flattering look across diverse complexions; this often involves finding the right balance of light temperature and using tools, such as zebras, on your camera to effectively monitor skin highlights and shadows.

Some general guidelines:

- Unless the mood of the shot dictates otherwise, use soft light.
- Natural light, especially on cloudy days, provides a balanced light source.
- Unless the style dictates otherwise, use fill lights to illuminate shadows and ensure details are visible on the face.
- Check the color temperature of your lighting, and adjust it to match the skin tone.
- Expose for the midtones of the skin, using tools, such as zebras, to monitor highlights and avoid blown-out skin areas.
- Be cautious not to overexpose darker skin tones, which can lead to a washed-out appearance.
- Utilize warm lighting to enhance the richness of deeper skin tones. This can be achieved by bouncing a gold reflector on the face.
- Check that the shadows on darker skin tones are not too pronounced, as this can make features appear harsh.
- Paler skin can appear washed-out, too, so adding warmth to the talent can also help.
- During post-production, carefully adjust color levels to fine-tune skin tones according to the desired style.
- Use masks to target specific areas of the skin for more precise color correction.

Night Illumination

Day for Night Shooting

The shot below was filmed in the morning using a puddle to reflect the shadowy subjects in the scene. We underexposed and used an ND filter.

Reflection of several figures in still water surrounded by reeds, tinted blue to simulate nighttime; the reflective surface and cool color grading demonstrate a day-for-night exterior lighting technique.

Figure 7.25. Day for night.

Shooting at night can be very tiring and expensive. An alternative is to use the day for night technique, meaning you shoot in the day but make the shot seem as if it was shot at night. This technique can be used for interior and exterior locations. Although some filmmakers frown upon this, it is good to try out and may prove useful.

Day for night shots are easy if you follow some basic rules:

- Avoid having the sky in the shot.
- Try to shoot on cloudy days, as the harsh shadows from sunshine are hard to disguise.

- Depending on what type of nighttime mood you want, change the kelvins to give you a blue hue. Historically, nighttime in cinema is blue in color.
- Underexpose the shot by about 2 stops.
- Add items, such as little candles or lamps.
- If you wish to create silhouettes that aid in selling that the photo is showcasing nighttime, use a backlight.
- In post-production, your color grading can enhance the nighttime visual even more.

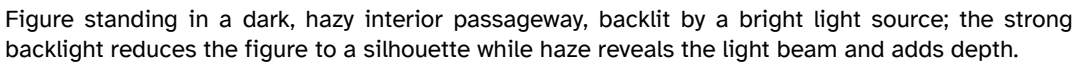
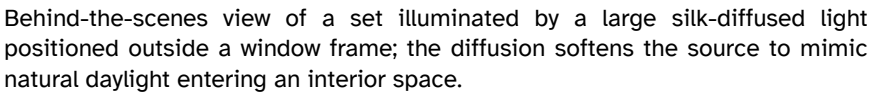


Figure standing in a dark, hazy interior passageway, backlit by a bright light source; the strong backlight reduces the figure to a silhouette while haze reveals the light beam and adds depth.

Figure 7.26. Silhouette.

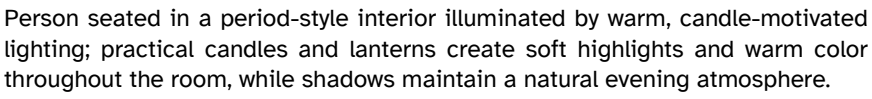
Can you see how the shot in Figure 7.26 looks as if it is showing the darkest of nights? This was shot in our studio in under three hours.

The shot in figure 7.27 does not look like much—until you see the result in figure 7.28.



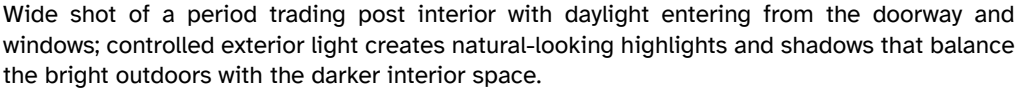
Behind-the-scenes view of a set illuminated by a large silk-diffused light positioned outside a window frame; the diffusion softens the source to mimic natural daylight entering an interior space.

Figure 7.27. Lighting set up for a cottage scene.



Person seated in a period-style interior illuminated by warm, candle-motivated lighting; practical candles and lanterns create soft highlights and warm color throughout the room, while shadows maintain a natural evening atmosphere.

Figure 7.28. Cottage still.



Wide shot of a period trading post interior with daylight entering from the doorway and windows; controlled exterior light creates natural-looking highlights and shadows that balance the bright outdoors with the darker interior space.

Figure 7.29. Shot using both interior and exterior lights.

Chapter Review

Knowing when to film during the day or night and how to use your apparatus, including your camera settings, will make your shots more professional. To control the sun, you must use all of the tools at your disposal. Your huge assortment of diffusion materials scatters the light, softens harsh shadows, and creates images that flatter your subjects. Using a variety of reflectors can enhance or reduce your light sources placing lighting onto subjects. Flags, in all of their shapes and fabrics, can effectively shape or block unwanted light. These instruments can be used outside, and the principle of their use is the same for exterior and interior shots.

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1. Roddenberry, Gene. Star Trek, The Original Season. Seasons 1-3, Episodes 1–79, Paramount Global, 8 Sept. 1966-1969. 1.07: Exterior Lighting Day and Night#return-footnote-821-1
2. Altman, Mark. "Star Trek Building for the Future." *Cinefantastique, Special Double Issue*, Oct. 1992, Page 84. 1.07: Exterior Lighting Day and Night#return-footnote-821-2

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Chapter 8: Lighting Plots and Recces

To help the gaffer and lighting crew visualize the lighting design on set, a light plot or lighting diagram is utilized. This enables them to set up and adjust lighting for each shot in a film and is an integral part of pre-production and production. There will be several examples of lighting plots in this chapter that contain floor plans, types of lights, positions and directions, intensity, and accessories used. The importance of location practice shots with ensuing light plots during the pre-production process must be emphasized (see Recce further in this chapter). There are several useful weblinks for information for New York State, including regional film offices, prospectors, NYC permits and the government Film Office, and an NYC Location Library.

Lighting Plots

Low-key interior scene with a masked figure seated beside a table, illuminated by cool directional light; selective highlights on the face, flowers, and lantern demonstrate controlled placement of key and accent lights.

Figure 8.1. Mask and Film Noir

Once a shot list and storyboard have been created, the director of photography will design a lighting plot for every shot. As the main decision-maker for lighting, the DOP determines the types of light fixtures, how many, their placement in the shot, intensity, color temperature, and temperature of lights to achieve the mood and aesthetic that the film's director has envisioned. The diagram will show, at the very minimum:

- where the talent is placed
- what types of lights are to be used
- where light fixtures will be situated
- what accessories are used on each light source
- backdrops, such as doors, walls, windows, etc.
- specific information, e.g., dolly or jib placement and direction

This blueprint efficiently communicates all lighting information to your crew and sets a clear plan in motion. Ideally, you should test the setups during pre-production planning. Having your lighting plan in place is more efficient and saves a lot of time, hassle, and money. This will also allow you to foresee any potential difficulties that can be overcome ahead of time.

A Basic Light Plot. The top corner shows one of the lights coming downwards. It is labeled Key 1K CTB. In the center is an oval depicting what is being lit. In the bottom corner from the oval is another light shape that reads Kicker 150K CTB. In the oval's other bottom corner, on the side closer to Key 1K CTB by an x-axis standpoint, it is a third light shape that reads Fill 300K CTB. In the same bottom corner from the oval, but above the light shape and the closest to the one up top, is more of a square shape with rectangles coming off of its ends toward the general direction of the oval to represent light coming out of it, as well. It is labeled Medium Angle MS.

Figure 8.2. Basic light plot example.

There are different tools you can use to draw up your lighting plots, such as simple pencil and paper, whiteboards, and downloadable apps for the web and cell phone. Although some free apps can have a few limitations, paid online software can also have limited capabilities, customization, and convenience. The lighting plot above was created in Microsoft Word.

There is a free, open-source software that you can try called Drawio. Although not created for filmmakers, it is easy to use and customizable. It enables users to easily drag and drop items onto a lighting layout, as well as import inspiration images to help the crew see your vision.

Black-and-white scene of a person seated at a table holding a handgun; hard side lighting creates deep shadows and high contrast, illustrating the visual result of a planned film noir lighting setup.

Figure 8.3. Reference photo for a light plot.

Figure 8.4 shows a template I used as an example for a film noir shot.

Lighting plot diagram for a film noir scene, showing camera position, talent placement, lighting instruments, modifiers, and set elements arranged in an overhead floor plan with a symbol legend.

Figure 8.4. Light plot example using draw.io.

You can choose any image as the reference photo to assist you and your team in gaining a good sense of your preferred mood, character, etc. In the lighting plot in figure 8.4, I used a film noir still that was shot in our studio. You can see the legend that shows what elements were used inside the frame. Under the camera information, I have included the type of camera, lens, and exposure information. You can include any information you want, such as diffusers, cookies, etc. Colors can also be changed to your preference.

More sample lighting plot templates are found in Student Resources at the end of the chapter.

Reconnaissance: The Recce

To conduct test shots, it is particularly important to see your location in person, in other words, conduct a recce. Coming from the French verb reconnaître, to recognize, a recce is a primary visit to a location to assess its viability for filming. In the USA it is more commonly called a site survey. The recce should gather as much information as possible and should include light meter readings, photos, and measurements of the location. The more information gathered, the better. Usually the location scouts, under the supervision of the location manager, perform the initial recces.

Consider these main steps to securing a location:

- Have a concise list of locations created by the producer/director/1st AD/production manager.
- Have department heads recce chosen shortlisted locations.
- Book the site. The location manager secures film permits/notifications, e.g., from residents, police, and city officials.
- Notify postponements due to issues, such as weather.
- Obtain insurance: have it for loss of life and limb/damage/filming time.

Many states have a location database for filmmakers to access. The NYC mayor's office of Media and Entertainment has the New York Location Library online database, which can be found on their website. For New York State, you can also search data at Explore New York State.

Group unloading equipment and supplies from a vehicle at a rural roadside location; gear is spread out for evaluating and preparing a potential filming site during a location scout.

Figure 8.5. This crew is gearing up for a site survey.

Before you scout a location, be prepared:

- Wear durable shoes.
- Bring adequate clothing for the weather.
- Bring a big bag!
- Bring a notebook and pen/pencil.
- Bring a camera for still photos of the location.
- Bring your fully-charged cell phone!

The shots in figures 8.6 and 8.7 are from a drone that students used on their recce. Their location was several hours away, and time was of the essence. This photo showed the DOP where the lake and the trees were in relation to the empty ground. They used the drone to photograph several angles.

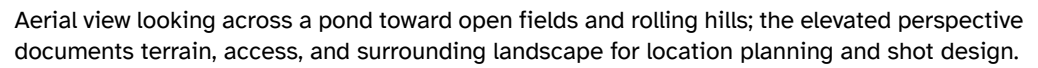

Aerial view looking across a pond toward open fields and rolling hills; the elevated perspective documents terrain, access, and surrounding landscape for location planning and shot design.

Figure 8.6. Drone recce still.

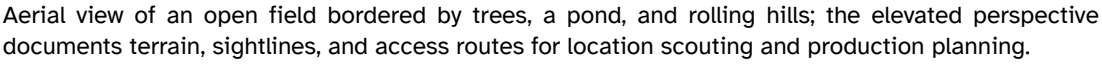

Aerial view of an open field bordered by trees, a pond, and rolling hills; the elevated perspective documents terrain, sightlines, and access routes for location scouting and production planning.

Figure 8.7. A second drone recce still from another angle.

The following should be gathered for initial information via your contact:

- type of material being shot
- time of shooting
- potential location of shooting
- map/directions that lead to contact person
- principal contact person:
  - address
  - phone number
  - e-mail address
  - permits

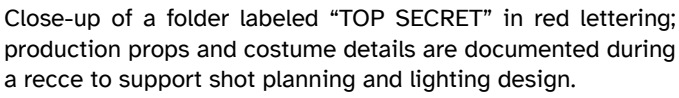

Close-up of a folder labeled “TOP SECRET” in red lettering; production props and costume details are documented during a recce to support shot planning and lighting design.

Figure 8.8.

Below is some information to keep in mind about gathering at the location:

- maps/GPS/compass coordinates
- directions to location
- photos of location in aesthetic form
- reverse photos showing where the camera would be in relation to cast/crew/equipment
- sketches and diagrams of location and surrounding areas
- floor plans
- access stairwells and entry and exit doors for cast/crew/equipment/vehicles
- dimensions: rooms, field acres, etc.

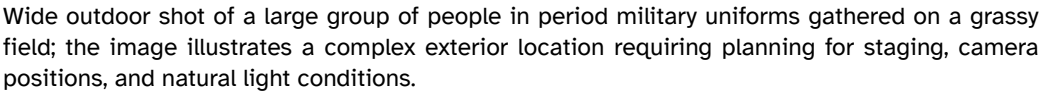

Wide outdoor shot of a large group of people in period military uniforms gathered on a grassy field; the image illustrates a complex exterior location requiring planning for staging, camera positions, and natural light conditions.

Figure 8.9. Reenactment still on location.

Recce/Site Survey Guiding Questions

Before you go anywhere, especially out of the country, answer the questions below:

- Do I need special permits/visas/vaccinations?
- What are the transportation links and issues, i.e., planes, trains, and automobiles, and on horse, camel, or foot?
- What accommodations are available?
- Is a local guide needed?
- Should I carry cash for under-the-counter finance (occasionally, a little financial tip can go a long way)?
- Do I have established emergency contacts and evacuation routes?

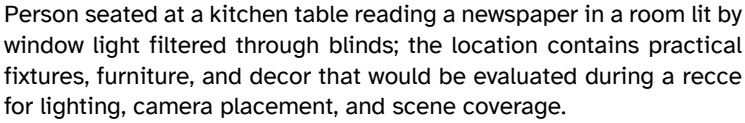

Person seated at a kitchen table reading a newspaper in a room lit by window light filtered through blinds; the location contains practical fixtures, furniture, and decor that would be evaluated during a recce for lighting, camera placement, and scene coverage.

Figure 8.10. Gather as much information as possible.

Consider these details about your camera:

- camera placement
- tripod size (can it fit?)
- camera mounting devices or platforms (are there any?)
- lenses (are there any?)
- objects in interference with shots (if there are some, how can the situation be corrected?)
- battery charging station (is there one, and is there AC access in it?)

Answer the following questions about your lights:

- Can spaces accommodate all the lights?
- What types of fixtures will be used?
- What placements will be used?
- How many will be used?
- Will light stands or particular light holders be used?Will light stands or particular light holders be used?
- Are lighting accessories needed?
- Will there be problems regarding mixing indoor and outdoor lighting?
- Will the sun's position at various times affect shooting?
- What kinds of shadow problems will there be and are there now?

Large group seated around a long dining table on a set, with place settings, food, and a central candle; the scene illustrates the need to assess space requirements, power distribution, catering logistics, and lighting placement during preproduction planning.

Figure 8.11.

Answer the following questions about your power:

- Will power be available, or is a generator needed?
- What is the voltage in the location? Remember, not all countries use 110V.
- Where are the electrical circuits, how many are there, and what is their condition?
- Where is the circuit breaker?
- Who can be contacted if a circuit blows?
- Which circuits can be used, and how many watts can run on them?
- What power outlets can be used?
- How many extension cords will be needed?

Consider the following about your audio:

- background noise interference, if any
- interferences corrections and how
- types of microphones that are used
- placement of microphones and cables
- microphone holders (e.g., will stands be needed instead?)
- mic cable and how much is needed

Person examining illuminated X-ray images on a medical lightbox; the bright viewing panel demonstrates how practical light sources within a location can affect exposure, contrast, and lighting design considerations.

Figure 8.12.

Do not forget the following:

- waste production and removal!
- weather conditions
- safety
- where to park and unload
- whether or not passes are needed to enter a location
- location access during off hours/seasons (e.g., are you allowed to access it at particular times?)
- food required and where catering can be set up
- storage of equipment/belongings and where to store them

Make sure you conduct a thorough inspection of all of your locations during your recce. Gather all the information you can regarding contact details, permits, parking and access, and detailed plans of each site, including the dimensions, equipment needed, power availability, amount of waste, and weather conditions. Take pictures, lots of them. Above all, check the location for any safety concerns, and follow your SOS protocols so your cast and crew will have a safe shoot.

Close up

More NY Film Location Resources

- NYS regional film offices at esd.ny.gov/local-regional-film-offices-new-york-state
- NYS prospector at www.newyorkstateprospector.com/
- NYC permits at www.nyc.gov/site/mome/permits/permits.page
- NYC government site for film at www.nyc.gov/site/mome/industries/tv-film.page
- NYC Location Library at www.nyc.gov/site/mome/industries/location-library.page

Chapter Review

Exercise

Look at this shot below, taken on a Navy ship. Conduct the recce as if you were scouting this location. Think about how you would do this. Using all of the points mentioned in this chapter, prepare a detailed recce report that you will send to a director and a producer.

Interior of a naval vessel with crew members standing beside a large metal bulkhead; overhead industrial fixtures create pools of directional light, deep shadows, and reflections on painted metal surfaces, illustrating the importance of evaluating existing practical lighting during a location recce.

Figure 8.13.

Exercise

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

Chapter 8 Student Resources

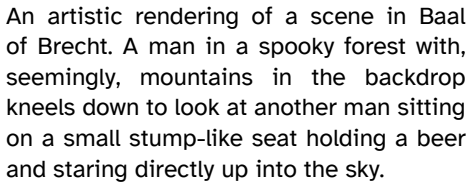
Resource Title	Link to document	Alternate format (if applicable)
Basic Light Plot Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Lighting Plot Example	PDF	

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- Template Lighting Plot, Draw.io Photo © Roslin Smith
- Recce prep © Ros Smith
- Drone Recce Still © Ben Anderson/Ros Smith
- Drone 2 © Ben Anderson/Ros Smith
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- British © Ros Smith
- Info gathering © Ros Smith
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Chapter 9: Film Noir and Production Case Study



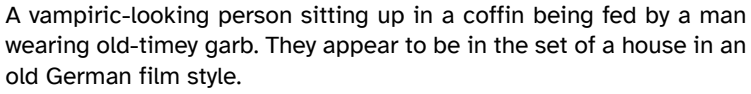
An artistic rendering of a scene in Baal of Brecht. A man in a spooky forest with, seemingly, mountains in the backdrop kneels down to look at another man sitting on a small stump-like seat holding a beer and staring directly up into the sky.

Figure 9.1. Scene 4 in Baal of Brecht by Hermann Scherer

The film noir genre relates to the lighting technique for a specific cinematic style. Although film noir is often thought to be gritty, gangster, and black-and-white, there are plenty of examples that differ from this stylistic mold, such as the glorious technicolor western *Johnny Guitar*[1] and the brooding sci-fi *Blade Runner*.[2] The stylistic elements of the film noir technique include canted angles and low-key lighting with extremes of dark and light in the filmic frame.

It is important to be aware of the influence of German Expressionism on American movie-makers. Prior to World War II, filmmakers, writers, artists, and philosophers were embracing a movement that reacted "against the bourgeois culture of Germany during this time period."[3] It affected the mindset of artists during the early part of the twentieth century who wished to show the inner essence of mind rather than reality. Distorted visuals, dramatic angles, and extremes of dark and light are just some of the hallmarks of painters at the time.

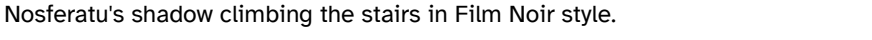
After the Great War, German filmmakers were short on film stock, equipment, and funds. The visual elements of German Expressionism lent themselves to cheaper ways for filmmakers to tell their stories. Low-key lighting, extreme dark and white contrasts, diagonal shapes, and canted angles (Dutch tilt) were prominent in filmmakers' cinematography at this time. These elements connoted a sense of unease, foreboding, fear, and inner turmoil of the mind. These stylistic elements are particularly exemplified in Robert Wiene's *Das Cabinet des Dr. Caligari (The Cabinet of Dr. Caligari,* 1920)[4] and FW Murnau's *Nosferatu,* 1922.[5]



A vampiric-looking person sitting up in a coffin being fed by a man wearing old-timey garb. They appear to be in the set of a house in an old German film style.

Figure 9.2. The Cabinet of Dr. Caligari.

When German filmmakers fled to America from the Nazis, these filmmakers influenced the style and form in American crime movies. The lighting techniques were increasingly used by Hollywood directors of photography (DOPs) such as Gregg Toland, who filmed Orson Welles' *Citizen Kane*.[6] Quintessential examples are John Huston's *The Maltese Falcon*, 1941,[7] and Billy Wilder's *Double Indemnity,* 1944.[8] The term *Noirs* was coined in 1946 by French film critic Nino Frank. When critiquing American crime movies such as *Laura* (Otto Preminger, 1944)[9] and *Murder My Sweet* (Edward Dmytryk, 1944),[10] he wrote, "Ainsi ces films « noirs » n'ont-ils plus rien de commun avec les bandes policières du type habituel." ["Thus, these films "noirs" do not have anything in common with the regular crime genres."][11]



Nosferatu's shadow climbing the stairs in Film Noir style.

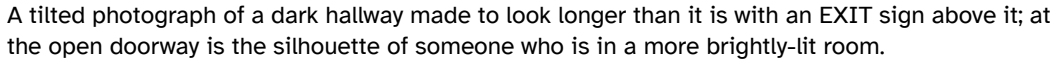
Figure 9.3. Nosferatu.

However, the filmmakers themselves did not think that they were making film noirs; they were just making psychological thrillers, mystery, crime, and romance films. In the 1960s, the burgeoning film critics in *Cahiers du Cinéma* began grouping these American movies, and applying Frank's term, "film noir," as a style or category. This stylistic influence can also be seen in more contemporary films such as *Blade Runner* (Ridley Scott, 1982),[12] Curtis Hanson's *LA Confidential* (Curtis Hanson, 1997),[13] and, more recently, the *Batman* trilogy.[14]

Of course, there are plenty of books, papers, and articles that hotly debate how to categorize "film noir." Is it a period in filmmaking history? A genre? A style? For our purposes, I wish to concentrate on the typical film noir lighting technique and the typical film noir elements inside the filmic frame.

Basic Noir Techniques and Strategies

Figure 9.4 shows the Dutch tilt/canted angle composition often found in film noir. There is only **one** light behind the actors, but it bounces off the shiny walls.

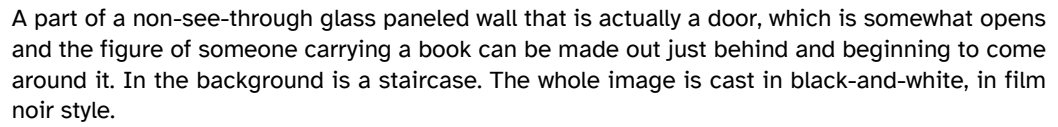


A tilted photograph of a dark hallway made to look longer than it is with an EXIT sign above it; at the open doorway is the silhouette of someone who is in a more brightly-lit room.

Figure 9.4. Canted angle.

This is an easy lighting technique to create, as it only involves one **key** light to emphasize dark shadows contrasted against bright whites. The light can be set up quickly but can look professional and aesthetically-pleasing.

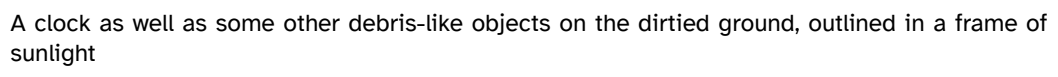
The intensity of the light can be manipulated with the distance of the light from the subject and set pieces. The closer to your subject, the more intense the light will be. The further the light from the subject, the less intense. The single light can also be spotted or flooded, to make the light harsher or more diffused (softer), or paired with a fog machine (see the fog machine safety sheet in Student Resources at the end of the chapter) for diffused light and a smoky atmosphere. Direct and shape how the light falls on your subject with barn doors (see information on barn doors in Chapter 6)



A part of a non-see-through glass paneled wall that is actually a door, which is somewhat opens and the figure of someone carrying a book can be made out just behind and beginning to come around it. In the background is a staircase. The whole image is cast in black-and-white, in film noir style.

Figure 9.5. Film noir door.

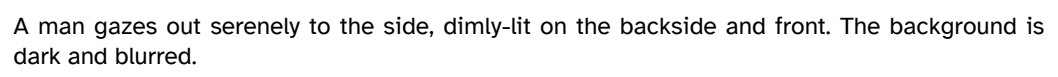
This shot below in figure 9.6 was taken using only the sun shining through a piece of cardboard that had gaps cut out of it.



A clock as well as some other debris-like objects on the dirtied ground, outlined in a frame of sunlight

Figure 9.6. Film noir cardboard clock in the sun.

The shot in figure 9.7 below used **one** light, but we added a small, circular gold reflector, giving our actor a warm glow and beautiful definition. See more about reflectors under Chapter 7, Exterior Lighting: Day and Night.

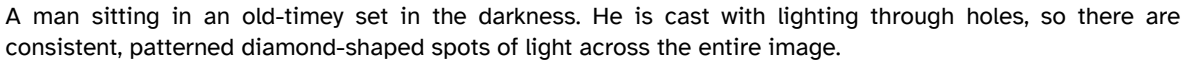


A man gazes out serenely to the side, dimly-lit on the backside and front. The background is dark and blurred.

Figure 9.7. De'sean Cruz in noir style.

The remainder of this chapter will guide you through the process of creating a production notebook to set a shot in the style of film noir.

Production Notebook Case Study



A man sitting in an old-timey set in the darkness. He is cast with lighting through holes, so there are consistent, patterned diamond-shaped spots of light across the entire image.

Figure 9.8. Corvin Bass in noir style.

Action!

See if you can determine where the key light was placed for the shot in figure 9.8. You can check your answer against the light plot in the Film Noir Light Plot linked in the Student Resources at the end of the chapter.

The medium shot in figure 9.8, using the film noir lighting technique, was filmed during class time in our large studio with only one carefully-placed light, a few props, a trellis, and two flats–one with a brick design and another plain dark brown. It took just under one hour to build the set, set the light, and complete three takes. However, even a simple set up needs careful planning ahead of time. Producers, production managers, and directors use a production notebook, usually a simple three-ring binder, to document and communicate the required equipment, costumes, and props.

The following section outlines the contents of a typical production notebook. A production notebook should also contain a table

of contents page and numbered pages and tabs for each section to make it easy to navigate on set. Having the notebook as a hard copy is highly recommended, to avoid access issues if you lose power or internet access. Note how there is no Section I or O, as these letters often look like the numbers one and zero, and confusion can occur.

Section A: Overview

This section has a broad overview/summary and a production calendar, including pre-production, production, and post-production.

Section B: Shooting Schedule: Day by Day

This schedule should include the dates, times, shots and/or scenes to be covered on a daily basis. This ensures all the cast, actors, props, sets, locations, equipment can be arranged ahead of time.

Section C: Script

This contains the whole script with appropriate page numbers.

Section D: Shot List

A shot list is a detailed document that outlines every camera shot needed for a film project, specifying elements like shot size, camera angle, and scene references. You can find a shot list example linked in the Student Resources at the end of the chapter.

Section E: Storyboard

It is important to have a visual reference to each shot which is called the storyboard. This can be basic stick people representing actors or elaborate paintings. Regardless, the main details of what is contained in the shot should be outlined – whether it is a big close up of a character's eyes, or an extreme long shot of a panoramic vista. You can find storyboard templates linked in the Student Resources at the end of the chapter.

Section F: Lighting Plot

This section contains the lighting plots for every shot.

Section G: Recce Information

Every piece of information that has been gathered during each location recce should be kept in this section. It will be constantly looked at by everyone prior and during production. Review detailed information on the recce in chapter 8

Section H: Equipment

Contains a comprehensive equipment master list, ranging from small items such as staples to heavy machinery like cranes. This list prevents critical omissions and avoids unnecessary expenses. Moreover, developing a dedicated resource checklist for every single shot ensures filmmakers are completely prepared prior to filming each day.

Below is an example equipment list that shows all the equipment used to set up the shot in figure 9.8.

Main equipment:

- camera (7D)
- AC connector and cable (battery not needed as connected to mains power)
- lens (55mm)
- lens cleaner kit
- CFast card, CF card reader, and cable

- tripod (Manfrotto)
- computer with Adobe editing software and AC connection
- external 1TB drive and cord
- clapperboard
- dry erase black marker pen

Lighting equipment:

- 1 light (Fresnel 650K: key)
- 1 light stand
- 1 set barn doors
- extra 650K bulb in case of blown bulb

Set design and grip equipment:

- stinger (heavy-duty extension cord)
- C-47s and storage bag
- gaffer tape (1 black roll)
- 1 lightweight, portable trellis
- 2 background flats (brown brick and plain brown)
- 8 C-clamps for flats and A-frames
- 4 A-frames
- 11 sandbags
  - 4 for trellis
  - 1 for key light
  - 4 for back flats
  - 2 extra

Section J: Costumes, Hair, and Make-up

For more than one shot, shot-by-shot breakdown lists would be created. An example of this is listed below:

- white tee shirt, size medium
- black pants, long, size medium
- black shoes, size 10 (although not really needed, as not in the shot)
- gel to make hair tousled and stand out in light
- light medium powder to stop shine

Section K: Props

For more than one shot, shot-by-shot breakdown lists would be created, too, such as:

- black wallet
- one “No Smoking” sign
- one small pin to hold sign on flat
- one small circular table
- one 1940s-style lamp
- one small picture
- two small vases
- one fake red rose
- one mirror, 3’ x 2’, silver frame

Section L: Crew Information

List all members of the crew with full contact details. This should include each member’s full name, address, phone number, emergency contacts, allergies, food preferences, and even a map to each member’s home address. GPS has gone off-grid before, and trying to give a crew or cast member a ride home may prove difficult without directions.

Section M: Major Cast Information

List each actor, name, contact details, headshot, dress, and shoe size and any relevant details; in this case we might include “dark hair slicked with some gel” for our main subject.

Section N: Minor Cast Information

The same attention to detail as the major cast and crew members should be applied.

Section P: Permits/Release Forms

You should ensure all of the following forms are diligently completed. If someone questions your permission to film or refuses to give permission to film, you have the paperwork to prove otherwise:

- location release permits
- talent release permits
- crew release permits

See the permission & release templates in the Student Resources section at the end of the chapter.

Section R: Safety

Include your safety data sheets and safety meetings that were conducted during the shoot, as well as a list of general safety equipment needed on set:

- first aid kit
- 2 fire extinguishers
- fire blanket
- safety data sheets
- safety checklist/safety meetings

Section S: Call Sheets

You should have call sheets for everyone and for every day/night. Updated call sheets should be posted at least the day before, especially when things have changed from the original schedule due to a variety of factors, e.g., weather, location issues, etc. You can find several examples for your own use in the Student Resources section at the end of the chapter.

Section T: Daily Reports, DOODs

The Day Out of Days (DOOD) chart is a one-page daily that report provides a visual overview of a production schedule by mapping actors across calendar days. It utilizes specific letter codes—**S** (Start), **W** (Work), **H** (Hold), and **F** (Finish)—to track when performers are active, on standby, or wrapped. This concise summary allows production teams to calculate talent costs accurately, streamline logistics for departments like wardrobe, and eliminate scheduling inefficiencies, so cast members do not wait around unnecessarily.

The Day Out Of Days (DOODs) example can be found in the Student Resources section at the end of the chapter.

Section U: Crafty

Food is important to keep people happy, healthy, and productive. If running a large production, pizza and cookies are not good choices. If you are having an 8-hour shoot, plan to give your cast/crew a decent meal.

Section V: Budget

Even if you are using resources provided by your school, draw up a budget to practice projecting costs on a production. You can use the template found in the Student Resources section at the end of the chapter.

Chapter Review

Exercise

Below are three shots we created in the film noir style of lighting in the studio. For each shot, answer the questions and follow the instructions:

1. Where was the key light placed?
2. What type of composition was used?
3. Draw a lighting plot for each shot.
4. Develop a mock production notebook for filming these three shots.

A man sitting with his hand across his chest, gazing upwards; a lot of him is cast in shadow, but you can make out some of his body from a cast of light slicing diagonally across the image.

Figure 9.9. Exercise 1.

A young man smiles as he reads a book; his face, neck, hands and the book pages are lit in contrast with the dark atmosphere.

Figure 9.10. Exercise 2.

A canted angle image of young woman gazing off and to the side. By her is a door with tape over its window, with PRIVATE DETECTIVE written on it.

Figure 9.11. Exercise 3.

Exercise

Crossword puzzle

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

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Chapter 9 Student Resources

Resource Title	Link to document	Alternate format (if applicable)
Film Noir Light Plot	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Location Agreement Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
DOODs Cheat Sheet	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)

Resource Title	Link to document	Alternate format (if applicable)
Extended Call Sheet Template	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
General Crew Release Form Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
General Cast Release Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Production Call Sheet Template	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
Simple Shot List Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Simple Call Sheet Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Storyboard Template	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
DOOD template	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)

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- Nosferatu is licensed under a Public Domain license
- Canted Film Noir © Roslin Smith
- Door Noir © Roslin Smith
- Film Noir Cardboard Clock and Sun © Roslin Smith
- Film Noir De'Sean Cruz © Roslin Smith
- Film Noir Corvin Bass © Roslin Smith
- Studio LS Film Noir © Roslin Smith
- Reading in Film Noir © Alex Wright
- Color Noir © Roslin Smith

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1. Johnny Guitar. Directed by Nicholas Ray. Republic Pictures. 1952. 1.09: Film Noir and Production Case Study#return-footnote-51-1
2. *Blade Runner*. Directed by Ridley Scott. Warner Brothers. 1982. 1.09: Film Noir and Production Case Study#return-footnote-51-2
3. "About German Expressionism" *German Expressionism in Special Collections Research Guide*. University of Maryland University Library. lib.guides.umd.edu/germanexpressionism. Accessed 15 May. 2026. 1.09: Film Noir and Production Case Study#return-footnote-51-3
4. *Das Cabinet des Dr. Caligari (The Cabinet of Dr. Caligari)*. Directed by Robert Wiene. Decla-Bioscop AG. 1920. 1.09: Film Noir and Production Case Study#return-footnote-51-4
5. *Nosferatu*. Directed by FW Murnau. Prana Film. 1922. 1.09: Film Noir and Production Case Study#return-footnote-51-5
6. *Citizen Kane*. Directed by Orson Welles. Mercury Productions, Inc.; RKO Radio Pictures, Inc. 1941. 1.09: Film Noir and Production Case Study#return-footnote-51-6
7. *The Maltese Falcon*. Directed by John Huston. Warner Brothers. 1941. 1.09: Film Noir and Production Case Study#return-footnote-51-7
8. *Double Indemnity*. Directed by Billy Wilder. Paramount Pictures Corporation. 1944. 1.09: Film Noir and Production Case Study#return-footnote-51-8
9. *Laura*. Directed by Otto Preminger. 20th Century Fox. 1944. 1.09: Film Noir and Production Case Study#return-footnote-51-9
10. *Murder My Sweet*. Directed by Edward Dmytryk. RKO Radio Pictures. 1944. 1.09: Film Noir and Production Case Study#return-footnote-51-10
11. Frank, Nino. *L'Écran français*. "A New Kind of Police Drama: The Criminal Adventure." No. 61, 28 August 1946. pp. 8, 14. Accessed 19 Jul. 2024. [quote translated by Margaret Holmes]https://filmnoir.art.blog/2013/09/16...e=EF&numero=61 1.09: Film Noir and Production Case Study#return-footnote-51-11
12. *Blade Runner*. Directed by Ridley Scott. Warner Brothers. 1982. 1.09: Film Noir and Production Case Study#return-

footnote-51-12

13. *LA Confidential*. Directed by Curtis Hanson. Warner Brothers. 1997. 1.09: Film Noir and Production Case Study#return-footnote-51-13
14. *Batman* trilogy. Various directors. Warner Brothers. 1989 to present. 1.09: Film Noir and Production Case Study#return-footnote-51-14

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Chapter 10: Butterfly Lighting/Paramount Lighting

Made popular by the movie studio Paramount Pictures, the Paramount lighting technique was a signature style for German actress Marlene Dietrich and became widely used for glamorous actresses. Also known as the butterfly technique, it creates dark shadows to define the chin, eyes, and cheekbones, along with a distinct butterfly pattern under the nose to flatter the face. This beauty lighting style is extensively used in contemporary photography and movies. This chapter details the nuances of this style, such as where the light is placed, how to achieve variations in the effect, and how the talent's movement in and out of the light affects mood and tension.

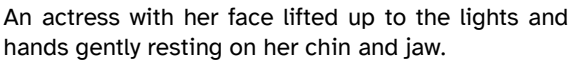

An actress with her face lifted up to the lights and hands gently resting on her chin and jaw.

Figure 10.1. Marlene Dietrich, *Shanghai Express*, 1932. Directed by Josef Von Sternberg.

This technique requires only **one** key light, is very quick to set up, and makes your subject look beautiful. It emphasizes cheekbones, slims the face, minimizes extra chins, and smooths wrinkles. Placed directly in front of the actor or actress, the key light is lifted high and pointed downwards at a 45-degree angle towards the subject. This effect works best when you slightly underexpose the subject and have the subject tilt his or her head up slightly to increase the butterfly shadow created under the nose. This looks fantastic when used with a fog machine, producing a soft, diffused light.

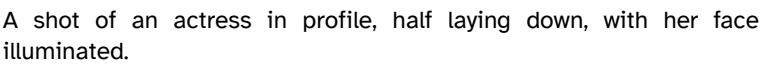

A shot of an actress in profile, half laying down, with her face illuminated.

Figure 10.2. Dietrich in *Stage Fright*.

During the 1930s, Marlene Dietrich made seven films with Austrian-American director, Josef von Sternberg; six movies were under a contract with Paramount. Sternberg's distinct visual style and themes, paired with Dietrich's image, defined the era's cinematic allure of beauty and mystique. Dietrich was also highly knowledgeable about lighting and photography, working closely with famous Hollywood photographer George Hurrell to control her image. When she was acting in *Stage Fright*,[1] she asked cinematographer Wilkie Cooper to adjust her lighting. Dietrich pointed out to him "exactly the lights he should use,"[2] and "she was dead right. For the close-up stuff, I could not have improved upon it."[3] See figure 10.2 for a still from this film. Although Dietrich is not facing the camera, the light's, high angle, pointing down at 45 degrees, is clearly visible on her face.

The disadvantage of this technique is that the actor cannot stray too far from the light. If you watch any of Dietrich's films, such as *Shanghai Express*,[4] you will see how she barely moves in her close-ups to maintain the butterfly effect. Even in long shots, she consistently kept herself looking slightly upward into the light. This lighting became Hollywood's signature technique, giving actors and actresses a glamorous look that is still used today.

Action

Watch Dietrich in Shanghai Express:

https://archive.org/embed/shanghai-express-1932-colorized-movie-720p-hd

Butterfly Technique Gallery

You can see that this technique works beautifully for a range of skin tones.

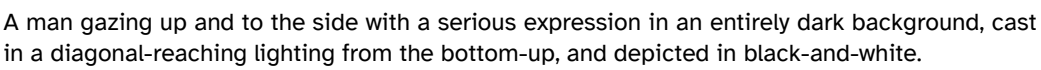

A man gazing up and to the side with a serious expression in an entirely dark background, cast in a diagonal-reaching lighting from the bottom-up, and depicted in black-and-white.

Figure 10.3. Butterfly lighting featuring Will Karr, SUNY Fredonia, 2022

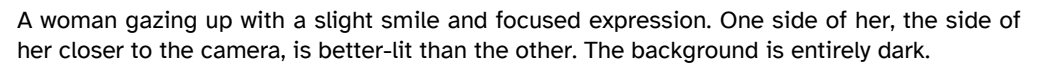

A woman gazing up with a slight smile and focused expression. One side of her, the side of her closer to the camera, is better-lit than the other. The background is entirely dark.

Figure 10.4. Butterfly Meryl Streep, SUNY Fredonia, 2021

A man gazing to the side and upwards. He is lit fairly head-on, although one side of him is a little better-lit, perhaps especially due to the way he is tilting his body. The background Is entirely dark.

Figure 10.5. Butterfly modification.

You can modify this look just by adding diffusion to soften shadows. Additionally, using a reflector to bounce some of the light can also change this look while maintaining the butterfly effect. The reflector should be angled upward, toward, and under the chin.

A man gazing up and to the side with furrowed brows and his hand on his chin, clearly thinking. His other arm is down at his side; it looks like he is sitting on something out-of-frame. He is lit fairly head-on, although one side of him is a little better-lit, perhaps especially due to the way he is tilting his body. The background is entirely dark.

Figure 10.6. Butterfly with bounce, SUNY Fredonia, 2020.

By experimenting with actors' features, skin tones, and costumes, as well as diffusers, gels, and dingles, etc., you can discover how versatile and beautiful your subjects can be.

Chapter Review

Knowledge Check Quiz

Interactive Content

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Low Light Practice Exercise

Light and shoot one low-light shot choosing between film noir, butterfly, or Rembrandt techniques. Try to create life and movement inside the filmic frame. Use whatever lens size or filter appropriate for the mood, tone, and subject. You do not have to record sound.

Chapter 10 Student Resources

Resource Title	Link to document	Alternate format
Butterfly Lighting Plot	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)

Media Attributions

- Marlene Dietrich, Shanghai Express, 1932. Don English (1901-1964) © Paramount Pictures is licensed under a Public Domain license
- Stage Fright is licensed under a CC BY-NC-SA (Attribution NonCommercial ShareAlike) license
- Butterfly; Will Karr
- Butterfly; Merle Steep © Ros Smith, SUNY Fredonia 2021
- Butterfly; Camera and Lighting Class; Nicholas Dohre © Ros Smith, SUNY Fredonia 2020
- Butterfly with Bounce; Nicholas Dohre © Ros Smith, SUNY Fredonia

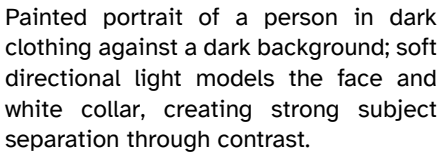
1. *Stage Fright*. Directed by Alfred Hitchcock, Warner Brothers, 1950. 1.10: Butterfly LightingParamount Lighting#return-footnote-844-1
2. Frewin, Leslie Ronald. *Dietrich: The Story of a Star*. Stein and Day, 1967, p. 115. 1.10: Butterfly LightingParamount Lighting#return-footnote-844-2
3. Frewin, Leslie Ronald. *Dietrich: The Story of a Star*. Stein and Day, 1967, p. 116. 1.10: Butterfly LightingParamount Lighting#return-footnote-844-3
4. *Shanghai Express*. Directed by Josef von Sternberg, Paramount Pictures, 1932. 1.10: Butterfly LightingParamount Lighting#return-footnote-844-4

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Chapter 11: Rembrandt Lighting

Watch closely, and you will notice that almost every film today contains at least one shot utilizing the Rembrandt technique. *Pirates of the Caribbean*,[1] *Iron Man*[2], and *Joker*[3] are just a few contemporary blockbuster examples. Slightly underexposed, this lighting style is popular as it creates dramatic yet natural-looking images. This technique uses only one key light hung slightly above the talent's head and at about a 45-degree angle to the side, and is characterized by a pale triangle of light underneath the actor's eye on the fill side of the face, emulating Rembrandt's chiaroscuro paintings. You can see this style in Figure 11.1. This chapter covers the evolution of this style in film and how to create it, including an apocryphal story on how Cecil B. DeMille dubbed the style.

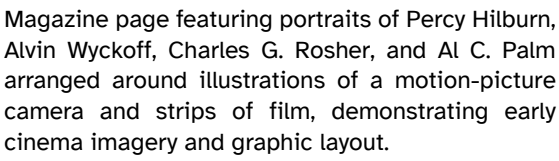
This setup creates a pale triangle underneath the actor's eye on the fill side of the face. Occasionally, a small reflector on the fill side can be used, but do not overdo the fill.



Painted portrait of a person in dark clothing against a dark background; soft directional light models the face and white collar, creating strong subject separation through contrast.

Figure 11.1. Portrait of a Man, Rembrandt, 1632.

W. Griffith (1875-1948) was one of the first directors to explore the use of lighting to connote mood and character in film. His film, *Enoch Arden*[4] released by Biograph in 1911, introduced soft illumination falling on characters' faces. This effect was achieved by bouncing or diffusing the light source of a shot, ensuring there were no harsh shadows on the subject in the filmic frame. At the turn of the century, stage playwright and producer David Belasco had been using contrast lighting for almost 20 years, partnering with Cecil B. DeMille and artistic director Wilfred Buckland, all of whom experimented with what became known as the Belasco style of lighting.[5]

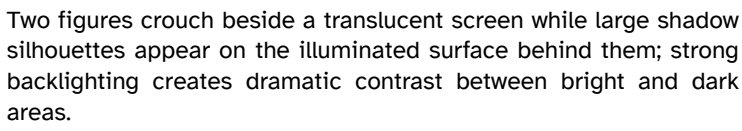


Magazine page featuring portraits of Percy Hilburn, Alvin Wyckoff, Charles G. Rosher, and Al C. Palm arranged around illustrations of a motion-picture camera and strips of film, demonstrating early cinema imagery and graphic layout.

Figure 11.2. Creators of Lasky Photography.

In 1913, DeMille, Jesse Lasky, Samuel Goldfish (later known as Goldwyn), and Oscar Apfel joined forces to create the Jesse L. Lasky Feature Play Company.[6],[7] DeMille, Buckland, and photographer Alvin Wyckoff refined Belasco's style. Wyckoff is credited with introducing artificial lighting to motion pictures with the use of Klieg lights, which became known as Lasky lighting.[8] These people experimented with "side lighting, leaving shadows on the faces, lit by lanterns lit by portable small spotlights to pinpoint light."[9]

Below in figure 11.3 is a still from the 1915 silent movie *The Cheat*.[10] Cecil B. DeMille was uncredited as the director, but the film does credit cinematography by Alvin Wyckoff and art direction by Wilfred Buckland. Notice how the filmmakers were experimenting with shadows on the wall.



Two figures crouch beside a translucent screen while large shadow silhouettes appear on the illuminated surface behind them; strong backlighting creates dramatic contrast between bright and dark areas.

Figure 11.3. Fannie Ward (playing Edith Hardy) and Sessue Hayakawa (as Hishuru Tori) in a scene still for the 1915 silent drama *The Cheat*.

DeMille, Wyckoff, and Buckland continued to experiment with side lighting, emphasizing the use of source lighting from windows, lamps, and fires.[11] In addition, they minimized diffusion, "creating isolated pools of directional light."[12]

This dark, chiaroscuro style was used for *The Warrens of Virginia* (1915), starring Mary Pickford.[13] When the completed film

reached New York theaters, the legend is that the exhibitors complained to Samuel Goldfish that "If we showed only half an actor's face... audiences would only pay half price."[14]

The story goes that Goldfish called DeMille to relay the exhibitors' consternation. DeMille replied that it was "Rembrandt lighting." A brief time later, Goldfish wired DeMille back, saying that the exhibitors were happy and that "people would pay double."[15] By 1938, the definition of Rembrandt in the film industry had been established as "the cameraman, or a particularly artistic shot."[16] So while DeMille is credited with naming the Rembrandt lighting technique, he did not invent the style, as cinematographers and directors were already experimenting with natural mood lighting at the turn of the 20th century.

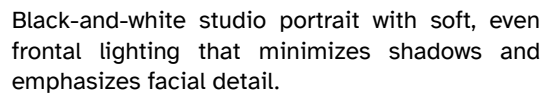


Figure 11.4. Mary Pickford in a portrait made specially for the Broadway play *The Warrens of Virginia*.

This beautiful, dramatic yet natural, dark lighting style is an easy set-up requiring only one key light with careful positioning:

- The camera is in front and facing the talent.
- The key light is positioned to the side of the talent, at about a 45-degree angle.
- The height of the key light should be just above the talent's head or can be almost at eye level depending on the subject's features.
- The side of the face nearest to the key light is illuminated.
- The other side of the face is almost in shadow, except for a small triangular area under the eye that is lit.
- A triangle should ideally be no wider than the person's eye and no longer than the nose.
- Everything else is dark.
- Add a reflector on the fill side of the face, at a 45-degree angle, and about four feet away from the talent. The fill side is the side opposite the key light. This can soften any harsh shadows but take care not to overfill the shadows.

Figure 11.5 shows my students' first attempt at Rembrandt. Can you spot the triangle under the eye? The key light is a little too "hot" (bright) on the illuminated side of the face. The students should have moved the key light a little further back on its stand. A little anti-shine powder would also have helped showcase the talent's lovely features.

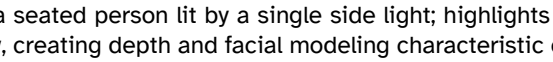


Figure 11.5. Rebrandt lighting set up by SUNY Fredonia film students featuring junior Eva Bobeck in 2021.

Figure 11.6 below was the second attempt by the students in the class. They used some diffusion and pulled the light back a little from the subject. They also applied some powder and makeup on the talent.

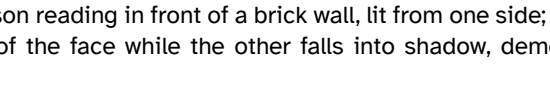


Figure 11.6. Another Rembrandt lighting set up by SUNY Fredonia students, featuring junior Nicholas Ensell in Spring 2023

You can see a lighting plot for this technique in the Rembrandt Light Plot in Student Resources at the end of the chapter.

Used by filmmakers for over a hundred years and still in constant use today, the Rembrandt technique can be set up quickly and is very effective.

Chapter Review

Exercise

Create a lighting plot for a shot using the Rembrandt technique to implement using one light. Observe the effect each of these adjustments has on the shot:

- Add a reflector (see more about reflectors in Chapter 6 Controlling Light and Lighting Accessories.)
- Experiment with color gels and diffusion techniques (See more about gels and diffusion in Chapter 6 Controlling Light and

Lighting Accessories, and Chapter 7 Exterior Lighting, Night and Day.)
- Experiment with shallow depth of field and props.
- Try racking and pulling focus.
- Experiment with different lens sizes and exposures.

Interactive Content

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Chapter 11 Student Resources

Resource Title	Link to document	Alternate format
Rembrandt Lighting Plot	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)

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- Motion picture studio directory and trade annual, 1916 © Motion Picture News, Inc. is licensed under a Public Domain license
- The Cheat 1915 © Lasky Feature Play Co. is licensed under a Public Domain license
- Mary Pickford in Warrens of Virginia, 1915 is licensed under a Public Domain license
- Rembrandt; Eva Bobeck © Ros Smith
- Rembrandt Technique Shot © Nicholas Ensell, Junior, SUNY Fredonia Spring 2023

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1. *Pirates of the Caribbean*. Directed by Gore Verbinski (1–3), Rob Marshall (4), Joachim Rønning, and Espen Sandberg (5). Walt Disney Pictures, Jerry Bruckheimer Films, USA. 2003-2017. 1.11: Rembrandt Lighting#return-footnote-57-1
2. *Iron Man*. Directed by Jon Favreau. Marvel Studios, Paramount Pictures, USA. 2008. 1.11: Rembrandt Lighting#return-footnote-57-2
3. *Joker*. Directed by Todd Phillips. DC Films, Village Roadshow Pictures, Bron Creative, Warner Bros., USA. August 31, 2019. 1.11: Rembrandt Lighting#return-footnote-57-3
4. *Enoch Arden*. Directed by D.W. Griffith. Biography Company, NY. 1911. 1.11: Rembrandt Lighting#return-footnote-57-4
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6. Katz, Ephraim, Fred Klein, and Ronald Dean Nolan. *The Macmillan International Film Encyclopedia*. 3rd ed., Macmillan, 1998, p. 795. 1.11: Rembrandt Lighting#return-footnote-57-6
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8. Jacobs, Lea. "Belasco, DeMille and the Development of Lasky Lighting." *Film History*, vol. 5, no. 4, 1993, pp. 405–18. JSTOR, www.jstor.org/stable/27670733. Accessed 20 Oct. 2024. 1.11: Rembrandt Lighting#return-footnote-57-8
9. Louvish, Simon. *Cecil B. DeMille: A Life in Art*. Thomas Dunne Books, 2007, Page 105. 1.11: Rembrandt Lighting#return-footnote-57-9
10. *The Cheat*. Directed by Cecil B DeMille. Jesse Lasky Feature Play Company, Paramount Pictures Company. 1915. 1.11: Rembrandt Lighting#return-footnote-57-10
11. Louvish, *Cecil B. DeMille*. p. 102. 1.11: Rembrandt Lighting#return-footnote-57-11
12. Louvish, *Cecil B. DeMille*. p. 105. 1.11: Rembrandt Lighting#return-footnote-57-12
13. *The Warrens of Virginia*. Directed by Cecil B DeMille. Jesse Lasky Feature Play Company, Paramount Pictures Company. 1915. 1.11: Rembrandt Lighting#return-footnote-57-13

14. Louvish, *Cecil B. DeMille*. p. 84. 1.11: Rembrandt Lighting#return-footnote-57-14
15. Louvish, *Cecil B. DeMille*. p. 84. 1.11: Rembrandt Lighting#return-footnote-57-15
16. “Evening Star.” *Evening Star* [Washington, D.C.], 1 May 1951, p. A-20. *Library of Congress*, info:lccn/sn83045462. Accessed 21 Oct. 2024. 1.11: Rembrandt Lighting#return-footnote-57-16

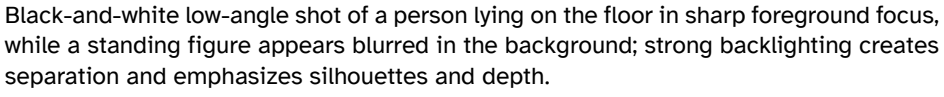
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Chapter 12: Three-Point Lighting

This chapter covers the basic method for using three separate lights—key, fill, and back—to illuminate subjects within the filmic frame. By controlling these three light sources, there are practically unlimited variations that can shape the mood and tone of the shot. Make sure you have mastered the information and skills in previous chapters before moving onto these techniques. For three-point lighting, at least one light should be a light fixture

, though alternative sources may be used for the second and third ones such as reflectors or the sun. This chapter outlines a straightforward process to enable you to set up each lighting fixture in an orderly manner, making sure the first light "is a purchase" before moving onto the next.

Focus! "That's a purchase": When a light has been set in place and will no longer be moved.



Black-and-white low-angle shot of a person lying on the floor in sharp foreground focus, while a standing figure appears blurred in the background; strong backlighting creates separation and emphasizes silhouettes and depth.

Figure 12.1. Three-point lighting example.

Three-point lighting controls the shadows, highlights, and contrast in a shot. This method adds spatial depth with solid representations of height, width, and depth. Consequently, creating a three-dimensional shot, giving the viewer a natural feel as it is close to what our eyes see in the real world. This technique is composed of three lights, placed at different spots around the subject, often in a triangular formation, and facing the camera.

1. Key light
2. Fill light
3. Back light

The key light brings the subject into focus and determines the direction of light, or in other words, the angle of illumination. The lighting ratio can be 2:1, meaning your key light is twice as bright as your fill light, or more depending on the mood and the style of your film.

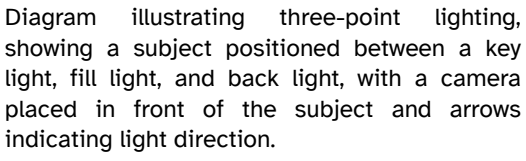


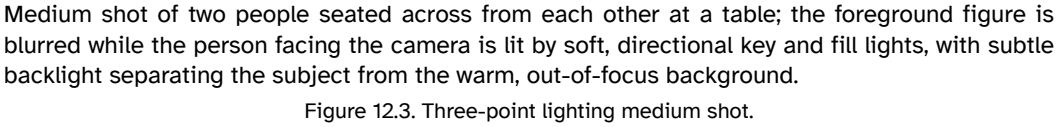
Diagram illustrating three-point lighting, showing a subject positioned between a key light, fill light, and back light, with a camera placed in front of the subject and arrows indicating light direction.

Figure 12.2. Three-point lighting set up from above.

The fill light brightens and reduces deep shadows that are created by the key light. It will start to separate the subject from the background and develop some spatial depth.

The key and fill lights are usually on opposite sides of each other but on the side of the camera. Of course, you can experiment and rearrange the lights to see what looks best for your subject, mood, and tone.

The back light throws highlights behind the subject and separates the foreground from the background. This enables the subject to seem three-dimensional by adding depth to the image.



Medium shot of two people seated across from each other at a table; the foreground figure is blurred while the person facing the camera is lit by soft, directional key and fill lights, with subtle backlight separating the subject from the warm, out-of-focus background.

Figure 12.3. Three-point lighting medium shot.

Key Light

The key light is the primary source of light in a shot, giving it an overall exposure and creating mood. It is the strongest, most intense (brightest) lamp and has the most influence in a scene and dictates placement for all the other lights being used. Depending on the placement of supplemental lights, the key can create a high-key image (evenly, softly lit, flattering, and with a positive mood) or a low-key image (high contrasts, deep shadows, and very atmospheric).

Before setting this light, determine the position of the camera and the placement of your subject/s inside the filmic frame. Do *not* switch on any other lights until you are certain that you will not change the key light. Spend as much time as you need to ensure you are placing the light where you want, following the basic points below:

1. Place the key light to the side of the camera so one side is well lit and the other is in shadow.
2. Position it slightly higher than the camera's viewing angle.
3. A lighting angle of 45 degrees to the side of your subject is recommended.

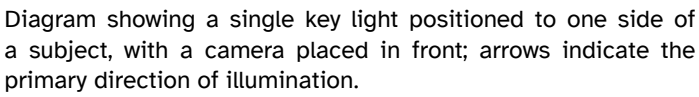


Diagram showing a single key light positioned to one side of a subject, with a camera placed in front; arrows indicate the primary direction of illumination.

Figure 12.4. Position the key light first.

Look at where the shadow falls on the nose of the main character in a shot. The shadow should fall as diagonally downwards as possible, creating a natural effect. Do not position the key light too high or too low, as it can seem odd to the viewer (unless you want this effect, of course). If you have aligned the light too much in front of the subject, or the lamp is too soft, the nose might not cast a shadow. This could cause the face/s to seem too flat and two-dimensional.

Fill Light

The fill is intended to correct the shadow of the key light, and this is why it is placed exactly opposite the key. It should not create its own shadow and is less powerful than the key (usually around half the power of the key).

The overall mood of the shot is helped by how dim or bright the lamp is. A dim fill light, where the ratio is high (8:1), creates a high-contrast, film noir type of shadow. A lower ratio (2:1) gives a subject a more evenly balanced feel. The fill light does not always have to be a light fixture. It can be a reflector, a white card, a mirror, or anything used to bounce light onto the subject, filling in the shadows.

- Second fixture, or bounce, placed exactly on the opposite side to the key
- Fills in the shadows that are created by the key light
- Usually softer and less bright than the key light
- Gives spatial depth, contrast, and accentuates the edges of the subject

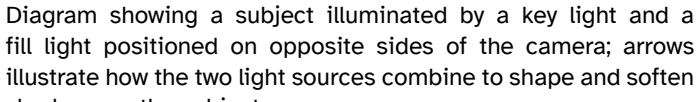


Diagram showing a subject illuminated by a key light and a fill light positioned on opposite sides of the camera; arrows illustrate how the two light sources combine to shape and soften shadows on the subject.

Figure 12.5. The fill light is placed opposite the key light.

Back Light

The back light is also called a hair or rim light. This lamp illuminates a subject from behind them, creating a rim of light around their head/hair. This separates the subject from the background, creating depth. It is placed directly behind the talent and can also be hung high, just offscreen. It can be on the opposite side of the key or the fill light, depending on the look you are after.

- Place the back light behind the subject to light an actor or object from behind.
- Place it higher than the object it is lighting.
  - This separates the actor or object from the background.
- It provides definition/subtle highlights around the subject's outlines.
- It provides a three-dimensional look.

- If it is placed at an angle, it's called a kicker.

See the lighting plot below that now has the back light in place.

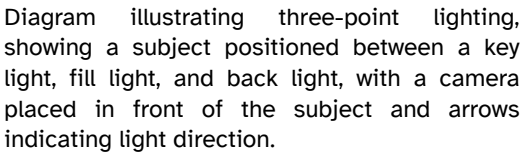


Figure 12.6.

The sun can be a key light and a back light—use a reflector to bounce the sun's rays at a lesser intensity back at the subject. The shot below had the sun on your right-hand side (screen left) as a key light and a small reflector on the opposite side. The sun was so strong it created a bounce-back light streaming through the wooden slats behind the man.

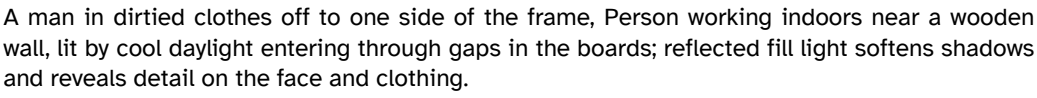


Figure 12.7. Sun as key and bounce-back.

Of course you can experiment with size, distance, intensity, position, degree angles, and color temperature of all these lights to create different moods.

These are guidelines for three-point lighting rather than absolute rules, and there is no definitive reason for how or when this technique should be used. It will depend on the subject, scene, and overall mood that the director and director of photography wish to evoke. Practice lots of lighting scenarios using your lights and see what great shots can be created by adding in elements such as dingles, cookies, and gobos.

Four-Point Lighting

Four-point lighting is the same setup as three-point lighting, with a fourth light illuminating the background so you can highlight the background of the scene. This does not create a rim or hair light but brings out items such as walls. This is used to prevent shadows cast by the foreground or to draw the viewer's attention to the background and adds extra dimension. It is placed either low on the ground or high up, facing the background.

Focus!

Jargon used when placing a light:

- Fly in a baby: bring in a 1K light and affix it to the correct light stand or holding device.
- Fly in a tweenie: bring in a 650K light and affix it to the correct light stand or holding device.
- Strike the baby: switch the 1K light on and off (USA).
- Strike the junior: switch the 2000-watt light on and off (USA).
- Going hot: switch the light on (UK).
- Kill the baby: can somebody please switch that 1K light off?
- Walk the baby back: bring the 1K light back from the subject.
- Push the baby forward: bring the 1K light closer to the subject.
- I need more beef: I need more light.
- Raise the light: use the light stand to bring the light up higher.
- Lower the light: use the light stand to bring the light down lower.
- Drop in a double: place a full/double/red-rimmed scrim in front of the light fixture.
- Drop in a single: place a half/single/green-rimmed scrim in front of the light fixture.
- That's a purchase: the light is now set, and you are not going to change/move anything on a light you are working with.
- Spike that spot: can we have some gaffer tape X to mark the spot for the talent to be placed?
- Woof!: stop!

- Crossing: a warning or courtesy said by anyone who must cross in front of a camera during setup. It lets the camera operator know this.
- Watch your back: warning said when coming through or around the set with an object that could hit someone.

Light Motivation

Before setting up your first light, you must determine its motivation. What do you want to achieve and why? Does it make sense based on the environment your character(s) inhabit? Is it interior night, exterior day, sunset, dusk, etc.? What genre is your film, e.g., horror, comedy, romance, historical? These can all determine your lights' motivation in a shot.

Light Source Size and Distance

See Chapter 6, Controlling Light and Lighting Accessories. You should determine the size of your lamp source according to the subject. Do you want sharp, distinct edges (hard) and so will choose small lamps? Or perhaps you want smooth, feathered lighting and need larger lights with diffusion or similar devices that create soft lighting?

Depending on the size of your lamp source, the distance from the subject to the lamp will affect the softness or hardness of the illumination. Shadows are softer if the lamp is closer to the subject, while shadows will be harder the further away the lamp is from the subject.

Intensity

How bright/intense do you want the light source to be? Brighter light will create harsher edges and shadows, while dim light creates soft shadows. A lighting ratio of 1:1 can be flat and dull with little dimension. A lighting ratio of 2:1 means the key light is twice the brightness of the fill and looks more cinematic. Practice using your light meter as seen in Chapter 6, Controlling Light and Lighting Accessories.

Position

Placement of your light fixtures determines where the shadows will fall. So, think about the motivation again. Is there supposed to be sunlight coming from a window, and hence your key light would be in that position? Is it dusk, so light is at a lower height and angle? Do you want a dark, moody feel or a happy, fun atmosphere?

Test and Adjust

Test your setup. After you have determined your lights' motivation, their size, distance, intensity, ratios, and position, set everything up so you can see exactly how all the lights work together and whether their effect is what you intended. If not, adjust until everything is perfect.

Chapter Review

Exercise 1

Determine the three-point light placements in figure 12.8 below.

Person aiming a rifle from behind rocks and tall grass at night, illuminated by strong blue-tinted backlight and atmospheric haze that separate the subject from the dark background.

Figure 12.8.

Exercise 2

Determine the four-point light placements in figure 12.9 below.

Black-and-white scene with one person behind vertical bars in sharp focus and another person blurred in the foreground; additional background lighting creates separation between subjects and the set, demonstrating four-point lighting.

Figure 12.9.

Exercise 3

Use these dialog cards to practice your on-set jargon.

Interactive Content

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Exercise 4

Have a look at figure 12.10 below and see if you can determine where the key, fill, and back lights were placed. Can you also see that it has a Rembrandt triangle on the fill side? This shot has a nice mixture of two techniques. Using the information in this chapter, try your own three-point lighting setup.

Medium shot of a person in a red hoodie seated in a softly lit interior; a focused key light illuminates one side of the face while the opposite side falls into shadow, and blurred figures in the background create depth and subject separation.

Figure 12.10.

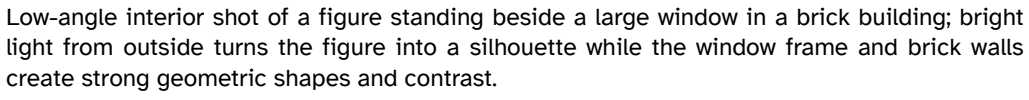
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Chapter 13: Motivational Lighting

One of the most fundamental elements is to understand motivational lighting: to make light sources appear natural and logical within the story's world, to create contrast and depth in a two-dimensional image, and to ensure the audience believes in the world of the characters and story. It is a good way to accentuate or imitate existing light sources, such as the sun, a table lamp, or a storefront neon sign. This chapter discusses how to build motivational lighting into a shot and incorporate practicals, color temperature, and bounce lighting to enhance verisimilitude. In real life, all light is justified by its source, whether it is the sun, moon, streetlamps, or interior light fixtures. To create a real-world on-screen means making the shot seem believable, regardless of whether it is a 17th-century cottage or a 21st-century restaurant. It is all about justifying the light sources; there is a logical reason for the light looking the way it does inside the filmic frame.

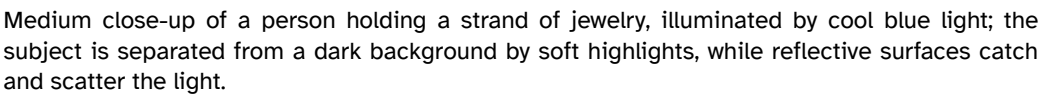


Low-angle interior shot of a figure standing beside a large window in a brick building; bright light from outside turns the figure into a silhouette while the window frame and brick walls create strong geometric shapes and contrast.

Figure 13.1. Lighting to suggest a stormy sky.

Motivated Light

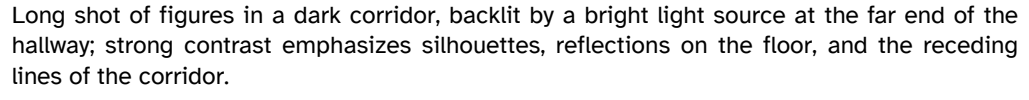
To the audience, believing a light source comes from a realistic one within a scene is extremely important. The ship scene in figure 13.2 was lit using a silver reflector bouncing off the key light. This was a cool, balanced sky panel, indicating the cold moonlight. The silver reflector also bounced through a Perspex water container to give the impression of water (taking care to use safety precautions for using water on set). The backlight and fill were more warmly balanced to give the impression of cabins in the background of the ship. This shot took just under three hours to set up, including designing the ship's deck background.



Medium close-up of a person holding a strand of jewelry, illuminated by cool blue light; the subject is separated from a dark background by soft highlights, while reflective surfaces catch and scatter the light.

Figure 13.2. Titanic moonlit water shot.

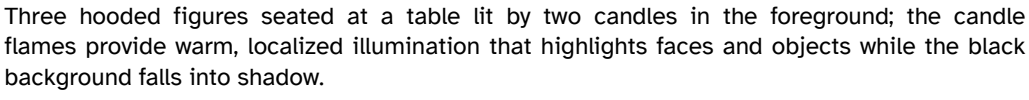
The silhouette shot in figure 13.3 of an abandoned building was created under extreme time constraints (the owners were demolishing it the following week) so while the set up was simple, the lighting aligned with the setting. One large key light bouncing off the shiny walls with some bounce board was enough to sell to the audience that this was a dangerous building, and the character was in jeopardy.



Long shot of figures in a dark corridor, backlit by a bright light source at the far end of the hallway; strong contrast emphasizes silhouettes, reflections on the floor, and the receding lines of the corridor.

Figure 13.3. Motivational light in an abandoned building.

These motivational sources can accentuate light either inside the filmic frame or as off-screen space, but it often takes time and attention to detail to create dynamic cinematic lighting. Practical lighting is an inexpensive and effortless way to do this, as it builds the world in which your subject inhabits on the screen.



Three hooded figures seated at a table lit by two candles in the foreground; the candle flames provide warm, localized illumination that highlights faces and objects while the black background falls into shadow.

Figure 13.4. Candlelight.

Practicals

Light sources that are visible inside the filmic frame are called practical lights or practicals. There is a dizzying array of these, such as bedside lamps, computers, flashlights, candles, etc. These light sources effectively establish motivated light sources in a scene and create a sense of realism for the audience.

Person working at a computer desk illuminated by a lit desk lamp positioned within the frame; the lamp acts as a visible practical light source, casting warm light across the desk and subject.

Figure 13.5. Practical desk lamp with computer.

However, practical lights have other functions beyond justifying light sources; they add depth, create separation from subjects, and give the audience narrative information. In figure 13.6's shot, the motivated light gives the impression of a sunny day outside. This shot was filmed at night and contains a key light with a cookie as well as fill and back lights. However, although you do not see a practical light fixture in this shot below, the lanterns on the ceiling give the impression that they are off-screen.

Interior scene with a terrified person in the foreground lit by warm directional light from an implied off-screen source; the lighting creates strong highlights and shadows while a second figure appears deeper in the room.

Figure 13.6. Practical off-screen lanterns by Ros Smith

Practicals justify where light is coming from and help create a harmonious illusion. Figure 13.7 is a simple film noir shot in the studio, completed in under an hour. The desk lamp is practical, serving as the source for illumination. However, the practical is doing very little. Using one key light off-screen right (the viewer's left) to illuminate the subject, there was also a small reflector bouncing the light onto the actor's face. The reflector also highlights the talent's plastic gun.

Person seated at a table holding a handgun beside a lit desk lamp; the lamp creates a concentrated pool of light on the hands and tabletop while the surrounding room falls into deep shadow, demonstrating motivated low-key lighting.

Figure 13.7. Practical desk lamp in film noir style.

Bokeh

A bokeh is any out-of-focus lighting fixture, but it is also used to describe points of light that appear as glowing dots or shapes. This technique is very inexpensive and quick to hang. The arrangements of multiple lights, such as fairy lights, bring an aesthetic quality to the imagery as well as also providing illumination.

Two people seated at a table with a bottle between them, surrounded by colorful string lights; the practical lights create warm highlights and multicolored bokeh in the foreground and background, adding depth and atmosphere.

Figure 13.8. Bar scene with fairy light practicals.

Color Temperatures

Although it is important to match the color temperatures of your practicals, if performed carefully, it can be valuable to mix your temperatures. Look at figure 13.9 below that was shot on a real submarine. This was a three-point lighting setup, but we added a few mixed-temperature practical bulbs into the overhead fixtures, so the overhead warm practical worked as a highlight, too.

Person standing in an equipment-filled industrial space illuminated by overhead fluorescent fixtures; visible practical lights provide the primary illumination, revealing machinery, pipes, and control panels throughout the scene.

Figure 13.9. Navy ship with mixed color temperature lighting.

Designing Your Shot

- Stage your set (windows, white walls, doors, etc.) and where your talent will be blocked, keeping in mind how you plan to set up your light sources.
- Decide the clear motivation behind your light sources.
- Decide the style of the shot, for example, film noir, high-key, or low-key lighting?
- Determine the time (daylight, moonlight, dawn) and tone for the shot (contemporary, futuristic)?

Think through the color temperatures that will achieve all these elements; for example, moonlight is cooler, while candles are

warmer.

Person working on a laptop in a café, illuminated by warm overhead and table lighting; practical light sources in the background create soft highlights and reflections that add depth to the interior scene.

Figure 13.10. Motivational lighting in a cafe scene.

By working through the exercises below and paying attention to motivated light, including practicals, color temperature, mood, and tone, you will be able to create fantastic, realistic cinematic shots that an audience believes in.

Group of figures gathered in a dark, fog-filled setting, illuminated by lanterns and candles; visible practical light sources create pools of warm light that contrast with the surrounding shadows and haze.

Figure 13.11. Motivated 19th-century lights.

Chapter Review

Two people seated at a table with a bottle between them, surrounded by colorful string lights; the practical lights create warm highlights and multicolored bokeh in the foreground and background, adding depth and atmosphere.

Figure 13.8.

Exercise 1

Look again at figure 13.8, which contains fairy lights.

1. Is the shot believable as a romantic two-shot in a bar or restaurant?
2. Determine where the light sources are: where is the key, fill, and back light?
3. Are there any other light fixtures other than the fairy lights?
4. Are there different color temperatures used in some of the fixtures?

Exercise 2

Look carefully at the three shots below, and for each ask yourself:

1. Where is the shot taking place?
2. Is the shot believable?
3. Where are the three light sources?
4. Are there any other light fixtures?
5. Are there different color temperatures used in some of the fixtures?
6. What do you think the narrative is?

Person seated in a dark room surrounded by candles arranged on the floor; the candle flames provide the primary illumination, casting warm light upward and creating strong contrast against the black background.

Figure 13.12.

Medium shot of two people against a rough concrete wall; one person wearing black gloves places their hands on the other person's head, while hard directional light creates strong shadows and emphasizes the texture of the wall and faces.

Figure 13.13.

Wide shot of a bedroom lit by blue-tinted light and scattered lanterns; a person bends over a bed while haze softens the scene, and practical lanterns create small pools of warm light throughout the room.

Figure 13.14.

Exercise 3

The shot below was color graded in post-production. Compare the shot in figure 13.14 with figure 13.15 below. Which one do you prefer, and why?

Wide shot of the same bedroom scene with muted, desaturated tones; a person stands over a bed surrounded by lanterns and haze, while soft, low-contrast lighting creates a faded, period-style appearance.

Figure 13.15.

Exercise 4

Set up a simple film noir shot.

1. What is the time and tone for the shot?
2. Decide the motivation for your light sources.
3. Use a practical to motivate your light sources.
4. Stage your set and where your talent will be blocked.

Once complete, modify the shot by adding more practicals or accessories such as cookies or dingles.

Exercise 5

Interactive Content

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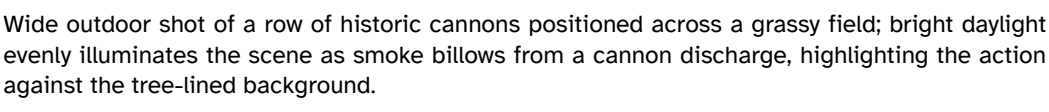
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Chapter 14: Lighting for Weaponry

Weapons are part of the action in a film, and some weapons even become iconic characters, such as the .44 Magnum revolver that Clint Eastwood carried in *Dirty Harry*. When Eastwood's character pulls out a gun and points it, close to the camera, at the antagonist, the audience knows it is dangerous. Due to effective lighting, we *feel* it is lethal. This chapter covers how to light different guns and knives as weapons for emotional effect. The same principles apply whether they are cannons, cutlasses, swords, or even rocks.



Wide outdoor shot of a row of historic cannons positioned across a grassy field; bright daylight evenly illuminates the scene as smoke billows from a cannon discharge, highlighting the action against the tree-lined background.

Figure 14.1. Cannons in action.

It is unlikely you would be filming this type of shot seen in figure 14.1 during class time, but safety for weapons relates to everything that can cause injury or death.

Safety

Review Chapter 2, Safety on Set. All weapons are dangerous regardless of the type and size. Sticks, baseball bats, knives, swords, spears, prop guns, firearms, rifles, and cannons (just to name a few) can all maim and kill. These high-risk activities need extra careful consideration during safety planning and procedures. The choice of weapon will determine what safety precautions are required and which safety data sheets must be used. You can find safety data sheets online, but I use the Contract Services site, which has a large database of the sheets.[1]

Major hazards from weaponry can be due to:

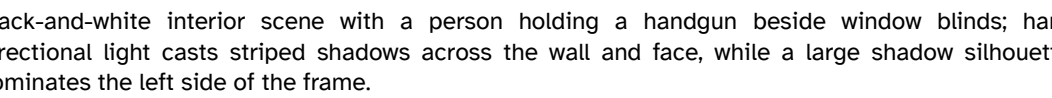
- Accidental discharge of a firearm
- Careless handling of a weapon
- Hearing loss from firearms
- Cuts and lacerations from metal weapons

Adherence to the safety policies and procedures should eliminate injury and death. Some institutions completely forbid the use of prop guns, let alone firearms. Local, state, and federal regulations will override the safety bulletin guidelines.

How to Illuminate Weapons for Effect

The focus for weaponry lighting is to illuminate the weapon realistically, almost giving the weapon a life of its own. You can use any lighting technique for your subject (e.g., film noir, high key).

Once those are in place, add at least one form of illumination specifically for the weapon. Sometimes it can be a small 100-watt lamp or a larger 650-watt Fresnel, and you should adjust the intensity and patterns of light when necessary. It will all depend on the shot size, mood, situation, and overall lighting style.



Black-and-white interior scene with a person holding a handgun beside window blinds; hard directional light casts striped shadows across the wall and face, while a large shadow silhouette dominates the left side of the frame.

Figure 14.2. Lighting a weapon in a film noir style.

The shot in figure 14.2 was taken using one light for film noir. This was the first week of class, so students had not reached the advanced knowledge for lighting weaponry. Although you can see the prop gun (in this case, rubber), adding a small lamp to highlight the gun nozzle would have added extra menace.

Use camera angles that enhance the illusion of danger without putting actors at risk. For example, a close-up that pulls focus from the actor's face or hand to the fake gun can lend a sense of danger to the audience.

Black-and-white interior scene with a person holding a handgun beside window blinds; hard directional light casts striped shadows across the wall and face, while a large shadow silhouette dominates the left side of the frame.

Figure 14.3. Prop gun in low-key lighting.

There were four lights used in the low-key lighting shot in figure 14.3 above: key, fill, and back lights. An extra light to bring out the actor's hands and gun was also used.

Action!

See if you can determine where the four lights were placed for the shot in figure 14.3.

Medium shot of a person holding a handgun against a dark background; a focused side light illuminates the face, hand, and firearm while most of the frame remains in shadow, demonstrating selective low-key lighting.

Figure 14.4. Three-point lighting of a prop gun.

The shot in figure 14.4 used three light fixtures. The key light, a 600 watt Fresnel, is on the right-hand side. A small 100 watt Fresnel, with diffusion on the barn doors, placed below the arm and slightly to the left side of his hand, and pointing upwards towards the prop gun. The backlight was a string of holiday lights. Just enough to give a little depth. The focus is the lethal gun barrel and the talent's face. This was a rubber (completely fake) gun on a closed set.

Firearm Guidelines

Please refer to the Firearms Safety Bulletin in the Resources table at the end of the chapter for in-depth industry guidelines.

Guidelines published by The Actors' Equity Association state, "Before each use, make sure the gun has been test-fired offstage, and then ask to test-fire it yourself."[2]

The guidelines below are basic ones to follow.

- Use a locked device to store the firearms.
- Follow the industry guidelines for managing firearms hazards on set.
- Thoroughly brief anyone involved in using a firearm at the on-set safety meeting.
- Include chain of command *and* emergency procedures in the on-set safety meeting.
- Train anyone using a firearm in safe handling and use.
- Specify the people allowed to handle the gun and strictly adhere to this specificity. If the prop master, weapons master, armorer, gun wrangler, and talent are the only ones allowed to handle the gun, no other cast or crew can even touch a gun, even if an actor tries to give it to you.
- Live ammunition should **never** be on set.
- Treat every gun as if it is loaded.
- Avoid pointing it at someone.
- **Never** put your finger on the trigger.
- **Never** leave a firearm unattended.

Person standing in shallow water holding a rifle, illuminated by strong blue backlight; bright highlights on wet clothing and water droplets create high contrast and separation from the softly lit background.

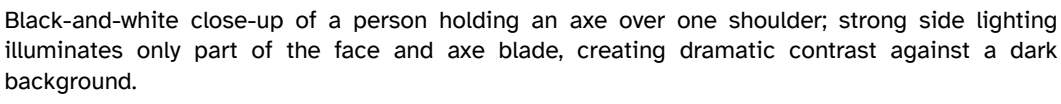
Figure 14.5. Weapon in the water

Metal Objects

Metal objects used as weapons can be knives, swords, axes, saws, or any other metal item you can think of. You should always use

specially made, blunt, or rubber weapons designed for filming. The fake ones work very well, so a real weapon is never needed. If shooting a fight scene, take care to ensure actors are trained by stunt coordinators and ensure the correct protective gear is worn. Always keep the blade pointing away from everyone else and follow safety protocols.

Please refer to the Piercing Props safety bulletin in Student Resources at the end of the chapter for in-depth industry guidelines.[3]



Black-and-white close-up of a person holding an axe over one shoulder; strong side lighting illuminates only part of the face and axe blade, creating dramatic contrast against a dark background.

Figure 14.6. Rubber axe.

The axe in the shot shown in figure 14.6 above was made of rubber and looked fake in real life. But, this moody, unusual lighting for green screen was highly effective in creating an axe that looked heavy and lethal.

Chapter Review

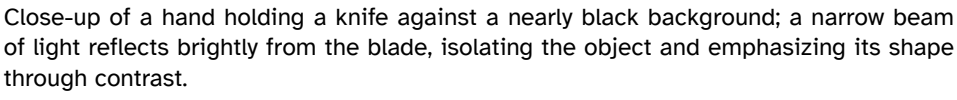
Exercise 1

Determine where the lights were placed in figure 14.6.

Exercise 2

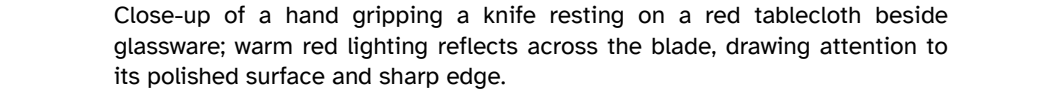
Look at the three shots below and compare them. Then try setting up your own versions.

1. Are they long shots, medium shots, or close-ups?
2. What composition rules are they following?
3. What styles of high- or low-key lighting are used?
4. Determine what lights were used and where they were placed.
5. Which shot seems more lethal to you?
6. What moods do each of the shots evoke?
7. Would you have lit the shots differently? If so, how?



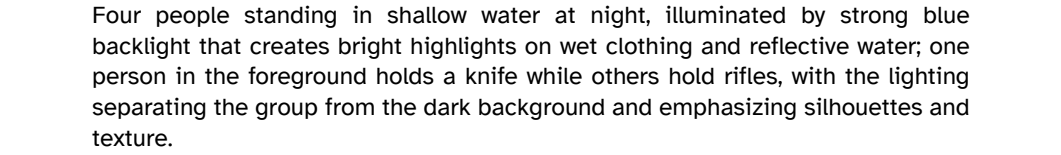
Close-up of a hand holding a knife against a nearly black background; a narrow beam of light reflects brightly from the blade, isolating the object and emphasizing its shape through contrast.

Figure 14.7.



Close-up of a hand gripping a knife resting on a red tablecloth beside glassware; warm red lighting reflects across the blade, drawing attention to its polished surface and sharp edge.

Figure 14.8.



Four people standing in shallow water at night, illuminated by strong blue backlight that creates bright highlights on wet clothing and reflective water; one person in the foreground holds a knife while others hold rifles, with the lighting separating the group from the dark background and emphasizing silhouettes and texture.

Figure 14.9.

Exercise 3

Interactive Content

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Chapter 14 Student Resources

Resource Title	Link to document
Firearm Safety	PDF
Piercing Props Safety & Data Sheet	PDF

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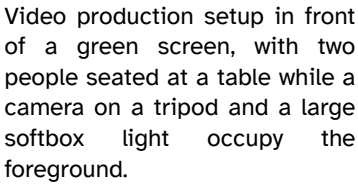
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1. Safety Bulletins. Recommended by the Industry-Wide Labor-Management Safety Committee for the Motion Picture and Television Industry. Accessed Dec 3, 2024.www.csatf.org/production-affairs-safety/safety-bulletins/ 1.14: Lighting for Weaponry#return-footnote-884-1
2. Actors' Equity Association. "Theatrical Firearms. Safety tips for the use of Firearms." Accessed Dec 3, 2024. www.actorsequity.org/resources/Producers/safe-and-sanitary/safety-tips-for-use-of-firearms/ 1.14: Lighting for Weaponry#return-footnote-884-2
3. Safety Bulletins. Recommended by the Industry-Wide Labor-Management Safety Committee for the Motion Picture and Television Industry. Accessed Dec 3, 2024. www.csatf.org/production-affairs-safety/safety-bulletins/ 1.14: Lighting for Weaponry#return-footnote-884-3

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Chapter 15: Green Screen



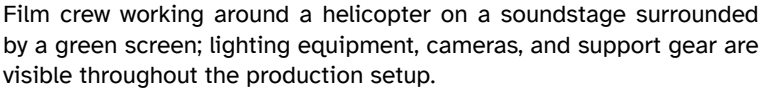
Video production setup in front of a green screen, with two people seated at a table while a camera on a tripod and a large softbox light occupy the foreground.

Figure 15.1.

In today's industry, working with green screens for effects is unavoidable. Green screen is the process of filming a subject or object against a monochromatic color. In post-production, replacing this color with a different image or video is called chroma keying. Green screen lighting must be precise to avoid a major headache and pots of money during post-production. Before using a green screen, it is important to review how to use a light meter. What light sources to use, where and how to place them, what to avoid, and difficulties are all discussed in this chapter.

Why Use a Green Screen?

Green screens are used if special effects or scenic backdrops that do not exist in real life (e.g., fantasy films) are required. Perhaps the budget does not allow for shots to be done in exotic locales, or it is too difficult or dangerous to be filmed in a location, as is the case with driving, train, and helicopter scenes.



Film crew working around a helicopter on a soundstage surrounded by a green screen; lighting equipment, cameras, and support gear are visible throughout the production setup.

Figure 15.2. Helicopter shot in front of a green screen.

Green vs. Blue Screen

The film industry has decided on two main colors—green or blue. Both colors are opposite on the color wheel to our skin tones. Skin tones tend to have reddish or orange hues, meaning it is unlikely to key out a skin tone (unless you have green or blue makeup on a subject). Hence, a green screen allows for better contrast regardless of your race.

The sensor on a camera has light receptors called photosites that are sensitive to three colors: red, blue, and green. Arranged in a **Bayer pattern**, also known as a Bayer filter or Bayer mosaic, these photosites have two green sensors for every red and blue one. This color array means that you have a cleaner image and easier time in chroma keying in post-production, saving time and money.

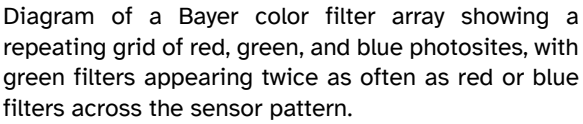
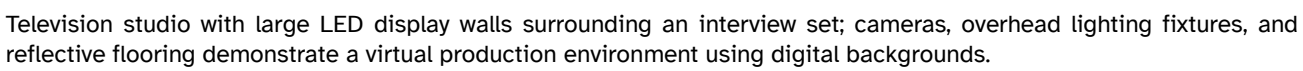


Diagram of a Bayer color filter array showing a repeating grid of red, green, and blue photosites, with green filters appearing twice as often as red or blue filters across the sensor pattern.

Figure 15.3. Bayer (GRGB) color filter array, as implemented with square photosites.

Blue screens are useful if your subject has green colors in the costume, make-up, or object or if there are natural green elements in the shot, such as trees or grass. However, blue screens tend to be about a third more reflective than a green screen. Blue screens also need twice the light–one more f/stop, since it is darker in color. If you are shooting outside, a blue screen might be easier due to the brightness of the sun. Keep in mind that the sun favors the blue end of the color spectrum. If shooting a low-light scenario, a green screen is better.



Television studio with large LED display walls surrounding an interview set; cameras, overhead lighting fixtures, and reflective flooring demonstrate a virtual production environment using digital backgrounds.

Figure 15.4. Blue screen example.

Types of Green/Blue Screens

Colors

For green and blue screens, there are two types per color: digital green and chroma green (green) and digital blue and chroma blue (blue). You can see below that the chroma colors (outlined) are darker than the digital ones. The digital greens are easier for digital camera sensors to read. If you are shooting on film stock, the older chroma key is great to use. It is highly recommended you choose the correct colors according to whether you are filming digitally or on film.

Side-by-side close-up comparison of blue and green screen fabric textures, with magnified inset views highlighting the surface detail and color uniformity used for chroma key compositing.

Figure 15.5. From left to right: digital blue, chroma blue, digital green, chroma green

Green Screen Walls

A sound stage/film studio often has a painted cyclorama wall, curving to the floor to eliminate harsh demarcation lines and shadows. The best green or blue screens are painted matte walls. Any other style of paint would have some shine and cause reflection issues (see reflections below). Large screens also cover the floor, though these tend to need repainting on a regular basis as dirt and dust accumulate quickly during use.

Production studio with a seamless green cyc wall extending onto the floor; a performer stands in the center while cameras, lights, and production equipment are positioned around the perimeter for chroma-key filming.

Figure 15.6. Green screen cycle wall & floor.

Green Screen Fabric

Green screens can also be made of fabric: muslin or heavy-duty, non-flammable drapes; however, you must ensure they are wrinkle-free and pulled tight to minimize shadows falling onto the screen when lit. Some cheaper brands use cotton, which wrinkles easily and is too dark a green compared to chroma key colors. Do not use fabric that is too thin or see-through.

Action!

What errors can you identify in figure 15.7 below?

Green fabric backdrop hanging against a wall, showing visible wrinkles, folds, and uneven surface texture that can complicate chroma-key compositing.

Figure 15.7.

Some screens are stretched tightly across a frame and come in a variety of sizes, such as 6′ x 6′, 8′ x 8′, 12′ x 12′, or 20′ x 20′. There are also rectangular pop-up screens, ones with a foot base and frame, or circular and oval-shaped pop-out ones. These ones are portable and not prone to wrinkling. They are good for tighter medium and close-up shots as they are 5′ x 7′.

Large rigid green-screen panel mounted within a freestanding metal frame; the smooth, evenly colored surface provides a consistent background for chroma-key work.

Figure 15.8. Green screen frame.

Best Practices

Black Balance/Shading the Camera

Ensure the camera is at its optimum operating temperature approximately 15 mins after powering it up. Set your camera for the ISO and shutter speed that you will be using for the shot (see more below under optimal settings to avoid motion blur)**.** Remove the lens and place the body cap on the camera. Follow the manufacturer's directions for black balance or calibrating the sensor.

Black balance removes any errant pixels, teaching the camera true black. **S**ee Resources section at the end of the chapter for the RED Scarlet XDragon black balance instructions.

You must ensure your subject is completely color-separated from the background color. Light your screen before lighting the subject, as the subject must match the shots you are compositing them into. Lighting for a blue screen is the same as for a green screen. Just keep in mind that blue is a third more reflective than green.

Ensure Lights Are Daylight Balanced

Avoid lights balanced for indoor light (2800-3200 K) and colored gels or dimmers on the green screen. Using red and orange light sources on the green screen makes a yucky, muddy mess. Use a light source that has wavelengths as close to green as possible. Daylight sources of 5600 K are near to the blue wavelength and close enough to green to maintain an accurate green screen color. See the difference below.

Side-by-side comparison of two green background samples, showing differences in hue and saturation used for chroma-key compositing.

Figure 15.9. Daylight (left) and tungsten (right) balance differences on green screen.

Use Soft Sources

In my studio I only need one of my larger daylight balanced skypanels to create a soft, even, shadow-free wash of light. You can use any light source, such as LEDs, just make sure it is daylight balanced. In a punch, bouncing fixtures off of beadboard is an inexpensive trick to spread soft light across the screen without causing shadows. If using this method, you should have two fixtures, one on each side of the screen.

Illuminate Evenly to Avoid Shadows

You **must** keep the light falling onto the screen at a uniform level. Top to bottom and side to side must be illuminated evenly. The smoother the light, the better the outcome in post-production. If in a studio or sound stage, often there are grid lights above that can be used to illuminate the screen.

It is also important to ensure the lighting on the screen is a half stop more than the key light. For example, if my key light measures f/4, then ensure the green screen lights allow for reading f/4.5. Take readings of the central area of the green screen, then ensure the sides, tops, and bottom of the screen match. Take lots of readings and adjust your lights accordingly. Consequently, there are no shadows falling onto the screen, which gives the effects editor an easier job for compositing.

Close-up of a person composited in front of a background of flames; the image demonstrates chroma-key compositing by combining a filmed subject with a separate digital background.

Figure 15.10.

Control Spill

Reflected green or blue light from the screen is always tricky. It should not fall onto your subjects. The key to preventing this is keeping your subject as far away from the screen as possible and using flags. (See Chapter 7, Exterior Lighting) Ideally, subjects should be eight feet or more away from the screen. Install flags just out of frame and behind the subject.

Focus!

Review: A flag is a device that blocks out light, consequently stopping light from falling onto areas of the scene. They come in assorted styles and materials.

Two people interacting in front of a digitally inserted forest background; the image demonstrates chroma-key compositing by replacing a green-screen backdrop with a wooded outdoor scene.

Figure 15.11. Zombies on green screen.

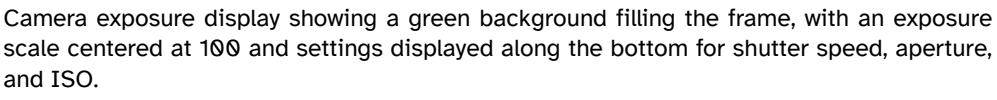
Action!

Look closely at the zombie shot in figure 15.11 above and locate the green spill that was caused by the subjects being too close to the screen background.

Control Motion Blur

Motion blur is caused by your subject moving too fast in front of the camera lens and sensor. This affects your chroma keying in post-production. It is better to avoid this in the first place, and the best way to control motion blur is with your camera settings.

You should shoot in RAW, as your editor will have more control of the data in post-production. Set your shutter speed faster than normal. This gives your subject sharper edges, allowing for easier isolation from the green background. For example, if you are shooting at 24 fps, then a normal shutter is 1/48th, so set your shutter at 1/90th or above.

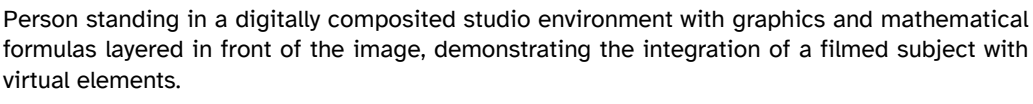


Camera exposure display showing a green background filling the frame, with an exposure scale centered at 100 and settings displayed along the bottom for shutter speed, aperture, and ISO.

Figure 15.12. ISO example.

Avoid an ISO that is too high, as noise on the image will mess with the chroma key in post-production. It is best to keep your ISO as close to the native one for your camera as possible, usually 400 or 800.

Keep your aperture wide, around f/stops at 4 or less, to achieve a shallow depth of field (see also Chapter 4, Lighting and Visual Composition for optimum requirements for shallow depth of field).



Person standing in a digitally composited studio environment with graphics and mathematical formulas layered in front of the image, demonstrating the integration of a filmed subject with virtual elements.

Figure 15.13. Minority green screen.

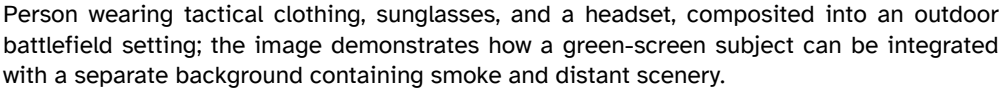
Things to Avoid

Shiny Materials & Intricate Details

Materials that cause reflections, such as reflective jewelry, leather, plastic, glass, metal, or anything else that can cause light to spill from the green screen. Take particular care if these materials cannot be removed. Dulling spray can be applied to metal objects to reduce reflections. Fringes on clothes or props are difficult to key out in post and should be avoided.

Fog/Haze Machines

Fog makes green screen keying exceedingly difficult, if not impossible, and further the fog is nearly invisible after applying the chroma key composites. Fog effects for green screens are best accomplished in post-production, using Adobe After Effects or similar.



Person wearing tactical clothing, sunglasses, and a headset, composited into an outdoor battlefield setting; the image demonstrates how a green-screen subject can be integrated with a separate background containing smoke and distant scenery.

Figure 15.14. Starship still.

Figure 15.14 is a still from a shot that took under two hours to set up and get in the can. Figure 15.15 shows the original green screen shot.

Person wearing tactical clothing, sunglasses, and a headset stands in front of a uniformly lit green-screen background while holding a prop rifle; the image demonstrates original footage captured for later chroma-key compositing into a different environment.

Figure 15.15. Starship original green screen.

Snow and Rain

Falling snow and rain (real or fake) will also affect the keying during post-production. Water reflects light, so during filming it will reflect green onto your subject regardless of how precise you are in lighting. These effects are also best accomplished in post-production.

Flares of Light

Extremely bright or unwanted light sources can cause light flares—light hitting the lens in a way that makes visible spots on film. Use a flag to block out any unwanted light.

Rear view of a person with arms outstretched, composited into a grayscale futuristic interface environment featuring geometric graphics, abstract panels, and architectural elements; the image demonstrates the completed result of chroma-key compositing and digital background replacement.

Figure 15.16.

The green screen effect actor was wearing a blue wig.

Figure 15.17 shows the original green screen shot before compositing.

Rear view of a person standing with arms outstretched in front of a uniformly lit green-screen background, prepared for chroma-key compositing into another environment.

Figure 15.17. Enders original green screen.

Green or blue screens are highly effective and can enhance your film by making it seem you have shot in exotic locations or fancy effects. Being knowledgeable and detailed with color, lighting, camera settings, and subjects will allow you to avoid time-consuming mistakes. Additionally, you ensure the finished product looks realistic and will not give your editor a headache during post-production.

Close up!

Green/Blue Screen Cheat Sheet

- Use a blue screen when objects in the shot have green elements or shooting outside.
- Black balance your camera.
- Light the screen first before lighting your subject.
- Place your subject about 8 feet or more from the screen background.
- Isolate your subject from the background as much as possible.
- Use soft source lighting on the screen.
- Ensure lights are daylight balanced.
- Ensure the screen is lit evenly by using a light meter.
- Prevent motion blur by setting a faster shutter speed, a wide aperture, and a native ISO.
- Avoid shiny materials in the shot.
- Avoid fog/haze/snow effects during filming; these will be added in post-production.
- Avoid light flares by using flags.
- Light your subject to match the background shot you are using in post-production.

Chapter Review

Quiz

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

Exercise

Figure 15.18 is a shot that shows an example of a green screen shot. Spot the errors.

Person standing in front of a green screen while wearing a blue-and-green plaid shirt; the green areas of the clothing closely match the background color, illustrating a common chroma-keying challenge.

Figure 15.18.

Chapter 15 Student Resources

Resource Title	Link to document
RED Scarlet XDragon Black Balance Instructions	PDF

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- Green Screen with 2 Men is licensed under a CC BY-SA (Attribution ShareAlike) license
- Helicopter Greenscreen © deerpark_ is licensed under a CC BY-NC-SA (Attribution NonCommercial ShareAlike) license
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GLOSSARY

#

“10-1” | Light-hearted code word to communicate that one needs the bathroom in a discreet and non-disruptive way.

“10-2” | Code word to communicate that one needs the bathroom for a longer duration or to signify a more serious situation.

A

Abby Singer | Second-to-last shot of the day. Named after famous assistant film director and production manager Abby Singer.

apple box | A box built of strong wood or plywood, capable of supporting weight. Comes in various sizes, the smallest of which is also known as a 'pancake' because it is nearly flat. Commonly used as steps, seats, and to raise props, dressing, or actors, but can be used for almost anything.

aspect ratio | Relative length and width of an image. Early cinema used a square ratio (4:3), whereas modern cinema uses a rectangular ratio (16:9 or 2.35:1).

B

baby | (1) A lighting unit with a 1000-watt (1K) bulb. (2) Any lighting unit smaller than a standard-sized unit of comparable intensity (i.e., baby 1K, baby 2K, baby 5K, etc.). See also baby plate.

baby legs | A very short, three-legged stand used to support, stabilize, and elevate equipment, particularly a camera. Used for extremely low-angle shots.

baby plate | A steel plate with a baby pin (⅝ inch pin) welded onto it. Used to mount lights or grip heads on a wall, box, or other surface.

ballast | An external power supply and regulator necessary to power and maintain an HMI lamp

barn doors | Folding metal flaps attached to the front of lights. Can be adjusted to control the shape, direction, and spread of light output.

Bayer pattern | A color filter array, aka Bayer filter or Bayer mosaic, applied to a camera sensor to enable it to produce red, green and blue samples.

bazooka | A camera mount, such as a tripod or a 2K stand, but without support legs; it only has one center shaft that raises the camera up and down. Has a junior hole at one end and a junior stud at the other. Usually has a sliding riser.

beaver board | A low-profile, flat stand made by mounting a baby pin to the surface of a pancake.

beef | The output of a light.

beefy baby | A heavy-duty stand without wheels that have light fixtures mounted such as 2K Fresnels.

best boy | Gaffer's assistant. Responsible for daily running of the lighting or grip department; for example, hiring and scheduling of crew, ordering/returning of lighting or grip equipment, workplace safety, timecards, expendables, loading production trucks, planning and implementing the lighting or rigging of locations and/or sound stages, coordinating rigging crews and additional photography units, handling relations with the other production departments, and serving as the main daily representative of the department with the unit production manager and coordinator of the film.

blackwrap | A thin, heat-resistant, versatile black aluminum foil. Used to temporarily mask light, control light spill, and make small flags. Also available as a self-adhesive tape.

blade | See finger.

blonde | An open-faced 2000-watt (2K) lighting unit that is usually used as a key light, floodlight, or bounce light to illuminate large areas

bobbinet | specialized, black mesh netting used for diffusing light. Also available in rolls for darkening windows.

boom | (1) A mechanical arm that the camera is mounted on. (2) A long, lightweight support for a directional microphone, operated by a boom operator to stay out of the shot while capturing sound. Used to capture dialogue in TV/Film production.

boom pole | See boom.

bottom chop | A technique where a flag or cutter is used to keep light off the floor or off the lower part of a frame or subject.

bounce | A solid white, gold, or silver reflective surface constructed out of poster board or foam. Used to reflect light to create softer, more diffused illumination onto the scene. Some have textured surfaces.

branch holder | A pipe-like unit with a locking nut. Used to hold branches, wooden poles, or other items.

broad | A rectangular, open-faced light used for general fill or for cyc illumination. Specifically designed to produce soft, diffused illumination without a lens.

brute | Arc light. Exceedingly bright and requires huge amounts of power, usually 225-450 amps DC powered. Introduced in 1947 by the company Mole Richardson and used to mimic sunlight. Very dangerous.

butterfly | Assorted nets, silks, solids, and grifflons that stretch over a frame and are used to light the subject or object, specifically for prime lighting scenes. Butterflies are usually 5' x 5', or 6' x 6' frame size, whereas butterfly kits are commonly a 12' x 12' or 20' x 20' size.

butterfly kit | See butterfly.

C

C-47s | See clothespins.

California scrim set | A scrim set with two double scrims. See also scrims.

Cam-Lok | A feeder cable connector used to distribute power to lighting and grip equipment. Like a Tweco but with a more positive locking mechanism, making it easier to disconnect.

“camera left" / "camera right” | Move the light left or right on the set.

candela | Unit of light intensity based on a standard candle.

catch light | See Obie.

celo cookie | Also called cello cucoloris, this is an abbreviation for a specific type of wire mesh coated with plastic. It contains patterns e.g. ferns and is placed in front of light to create depth to shot. See also cookie.

century stand | A general-purpose, versatile grip stand. Used for holding lights, floppies, cutters, and anything else that needs to be stabilized.

chain vise grip | Aka locking chain clamp, A plier that replaces the traditional solid jaws with a flexible, heavy-duty chain. The chain wraps around an object and hook it into place. It is especially useful for locking around unusual shapes.

Chiaroscuro | A lighting technique that creates a high contrast look by using strong contrasts between light and dark in an individual scene. Originates from two Italian words meaning bright (“chiara”) and dark (“oscuro”).

Chief Lighting Technician | Head of the electrical department, responsible for the execution (and sometimes the design) of lighting plans. Used as a chief electrician in films since 1936.

Chimera | See softbox.

China ball | Also known as a Chinese lantern. An inexpensive light source where a light bulb (e.g. 40w) is placed inside a paper-covered wire-frame globe. Usually made of white paper or nylon, it is lightweight and produces soft 360-degree light.

Chinese lantern | See China ball.

Chroma key | Visual effect technique used during postproduction to isolate and remove a specific color such as green or blue from an image.

cinematographer | Oversees the lighting crew and makes creative decisions.

clapper | See slate.

clothespins | Ordinary wooden clothespins used to secure gels to barn doors. Also called C-47's.

CLT | See Chief Lighting Technician.

combo stand | Also known as a combo box. A heavy-duty 2K stand without wheels, including both a baby pin (⅝ inch) and a junior receiver (1⅛ inch). Allows it to support both reflectors and lights.

cookie | An object with cut-outs used to cast a shadow pattern with a certain look, such as curtains or trees. Short for cucoloris.

cribbing | Short pieces of lumber used for various grip purposes.

“crossing” | A warning or courtesy that lets the camera operator know that someone is crossing in front of a camera during setup.

cucoloris | See cookie.

cup blocks | Wooden blocks with a dish or indentation in the center. Used to keep the wheels of light stands from moving.

cutter | See finger.

cyc lights | Row lights used to evenly illuminate a cyclorama or other background, preventing shadows and hotspots.

cyclorama | Also known as a cyclorama wall. Permanent background built in a studio. Nearly always covered or curved at the floor line to create a shadowless, unending backdrop.

D

dance floor | A temporary floor built from ¾ inch plywood or plastic sheets, usually covered with masonite. Used to create a perfectly level floor, providing a smooth surface for a camera dolly. Allows the dolly to be pushed in any direction with minimal bumps and vibrations to the camera in situations where it is impossible to lay a track on the set or when the camera move is more complex than a simple push-in.

dead cat | A fuzzy windscreen cover for a shotgun microphone on top of a boom. Used to block wind noise during outdoor shoots.

deuce | A 2000-watt (2K) tungsten Fresnel lighting unit. Named for the two in its wattage, it provides powerful illumination as well and often used as a bright key light.

dichroic filter | A filter that changes the color of the light by selectively reflecting certain wavelengths of light away while transmitting others.

diffusion | A white, non-flammable material used to soften, diffuse, or spread out a light source. Ideal for getting rid of harsh lights at sea. Comes in a variety of thicknesses and textures.

dimmer | A device used to control the power of the lamp.

dingle | A piece of cut-off foliage or branches. Placed in front of a light to create a shadowed pattern, such as a tree shadow, on the subject or background to add a realistic effect.

diopter cup | A rubber that covers the eyepiece on a camera to prevent light from entering the viewfinder, making it more comfortable for the user to use.

director in a box | A term used to allow the interviewer's reflection to be seen by the interviewee directly in front of the camera lens using an EyeDirect from VFGadgets. Gives the interviewee a convincing eye line right into the camera lens while still being able to interact with the interviewer.

Director of Photography | See cinematographer.

dolly | A wheeled cart or platform on which a camera can be mounted and rolled from point A to point B in a smooth-moving shot. Slides along a track similar to a train track. An extremely heavy piece of equipment; avoid being too close to the grips when they are looking for a hand carrying this up the stairs. See also doorway dolly.

doorway dolly | A plywood dolly with four soft tires, narrow enough to fit through a doorway. Used to carry a camera on a tripod or for transporting other heavy items. See also dolly.

dots | Small nets and flags used for precise and detailed control of light. Small and round in shape.

"drop in a double" or "drop in a single" | Place a full/double/red or a half/single/green rimmed scrim in front of the light fixture.

duvetyne | A heavy black cloth treated with fireproofing material that can control light by blocking or absorbing it. Used to create solid flags to block out windows, cover equipment and cables, and for hundreds of other uses.

E

ear | See spider.

Edison plug | A standard American household plug with two flat blades and a round or U-shaped ground pin.

ellipsoidal reflector floodlight | Also known as a scoop. A large, lensless fixture with a dome-shaped, ellipsoidal reflector. It collects and casts a wide, soft wash of illumination.

ERF | See ellipsoidal reflector floodlight.

eyelight | See Obie.

F

fay | Also known as MoleFay. A 650-watt Parabolic Aluminized Reflector (PAR) light with a daylight balanced dichroic filter. The filter converts the yellow hue of tungsten bulbs into daylight without losing the intensity of the lamp.

feather | Moving a flag closer to or further away from a light source to feather (soften/harden) the shadow on the surface upon which the light falls. Creates a smooth, gradual transition between highlights and shadows to produce more natural, diffused lighting.

filament | A thin wire (usually tungsten) inside incandescent light bulbs. Responsible for light emission.

fill lighting | Using a fill light to "fill in" the shadows created by the key light and balance contrast.

finger | Small nets and flags used for precise and detailed control of light. Long and narrow in shape.

firestarter | A 64 PAR VNSP 1200-watt light. It has an intense, concentrated beam that generates massive amounts of heat that can scorch, melt, or ignite nearby flammable materials. Very dangerous.

first company grip | The chief grip who works directly with the gaffer. In charge of some of the equipment related to the lighting. Oversees a crew of grips and supervises camera cranes, dollies, and other platforms or supporting structures according to the requirements of the Director of Photography. Ensure safety on the film set in the presence of theatrical ballistics, pyrotechnics, stunts, and other hazardous stunts.

flag | A device used to block, shape, or cut light to create shadows, add contrast, or prevent lens flare. It is typically a rectangular metal frame stretched with opaque black duvetyne fabric flags. See also dots; finger.

floppy | Square or rectangular frames with black fabric used to control the light. Can be used to 'cut the light off a certain subject or to blackout an area for the director's monitor.

“fly in a baby” | Bring in a 1000-watt (1K) light and affix it to the correct light stand or holding device.

foamcore | Polystyrene sandwiched between paper; stable and easily cut. Used to make reflectors, soft boxes, and many other items.

G

gaffer | See chief lighting technician.

gaffer tape | Heavy-duty tape used for a wide variety of purposes, including securing wires to prevent tripping hazards.

gel | A transparent, colored filter placed in front of a light to manipulate the color output.

genny operator | The person who operates the generator on set.

globes | Any glass bulb with a tungsten filament.

“go/going hot” | Said when turning on a light on a set in the UK. Warns the crew not to look directly into the light when it is switched on and to warn them when it is being switched off.

gobo | A physical stencil or template slotted inside a profile spotlight (between the optics and the lighting source) to create a sharp picture in the emitted light.

grid cloth | A waterproof diffusion fabric, often made of nylon, with a grid pattern sewn into it. Used to soften hard light while maintaining some shadow definition and control over the light’s direction. Available in different degrees of diffusion: full grid (1 stop), half grid (½ stop), quarter grid (¼ stop), and so on.

Griff | See Grifflon.

Grifflon | A durable material made of three-ply high-density rubber. The material is attached within a frame and used to cut, soften, or reflect direct sunlight. Generally comes in three sizes: 6' x 6', 12' x 12', and 20' x 20'.

grip tape | See gaffer’s tape.

H

header cable | Robust, weather resistant, heavy-duty cable that connects the HMI light to a ballast. It transfers both power and data between the ballast, that regulates the current and voltage, and the HMI lamp.

highboy | A heavy-duty rolling stand, usually with a combo head, that has a junior receiver and a large grip head. It can reach extreme heights, typically 6 feet to over 20 feet tall to support large lighting fixtures, overhead diffusion frames, and backdrops. See also lowboy.

highlight | See Obie.

HMI lights | Hydrargyrum medium-arc iodide (HMI) lights. Creates bright white light with a color temperature of 5600 Kelvins, mimicking sunlight.

Hollywood box | A sturdy, hollow wooden crate used for various tasks such as elevating actors, supporting props, or serving as a temporary seat or stepladder.

hot leg | Hot (black) live wire that runs into the service panel.

house power | The electrical power available at the shooting location as opposed to power supplied by the electric generator. Always confirm with the electrical department if using house power is acceptable.

I

“I need more beef” | Said when there is more light needed.

incident light | The amount of light falling onto a subject. Readings are taken with a handheld light meter placed at the subject’s position. See also reflective light (opposite).

inkie | A small 250-watt Fresnel-type light.

J

J-LAR | A transparent tape used to splice gels together.

juicer | A term for an electrician.

junior | (1) A 2000-watt (2K) Fresnel lighting unit. See also deuce. (2) Any 1⅛ inch spud, mounting pin, or any 1⅛ inch female receiver.

K

key grip | See first company grip.

key light | The main source of light illuminating a subject in a shot.

kick | An object with a shine or reflection on it from another object.

“kill the baby” | A request to switch the 1000-watt (1K) light off.

kiss | A light that gently brushes a subject.

L

lamp | Another word for light.

“last looks” | Last chance to check the actors, set, or camera.

LED lighting | Light-emitting diode (LED) lights, which are a standard, energy-efficient lighting tool.

legs | The legs of a tripod, usually made from carbon fiber. On most professional tripods, the head and legs can be easily separated, as they are lightweight, durable, and well-suited for extreme conditions.

lexan | A plastic sheeting material available in varying widths. Optically clear, tough, and highly heat-resistant. Used to protect camera personnel from explosions or the results of other stunts.

light meter | A device used to measure the brightness of a light.

location manager | The person who oversees the locations for a production.

lowboy | A heavy-duty rolling stand, usually with a combo head, but without the height of a highboy. See also highboy.

Lowel-lite | Invented by cinematographer Ross Lowell. Also known as an omni-lite. An open-faced tungsten and halogen lighting fixture that is portable, compact, and versatile. Useful in documentary, interviews, and low-budget film productions.

lumisphere | A white, shiny globe piece on a handheld light meter. It measures the amount of light falling on the subject, or light emitted off a subject. Cinematographers set the correct exposure on the camera or ensure there are no shadows falling onto a green screen cyclorama.

M

magic cloth | A heavy-duty diffusion fabric that scatters harsh beams from light fixtures. It eliminates sharp shadows and can merge multiple light sources into a single, seamless, and flattering soft glow.

martini | See martini shot.

martini shot | The last shot before wrapping for the day. Called the ‘martini’ shot because the next shot would be taken out of a glass, i.e., post-wrap drinking. It’s also said that, in the early days of Hollywood, stars would begin their post-wrap party a little early and start drinking martinis during the last shot.

mater | See mater clamp.

mater clamp | A small, adjustable clamp with a baby stud that can be interchanged with a variety of accessories.

maxi-brute | A 9-light unit with (9) 1000-watt PAR 64 lights.

meat-axe | A grip arm-like accessory designed to clamp onto the handrail of a studio overhead catwalk, or other suitable surfaces. Has a gobo head at the end of the arm.

mickey | See redhead.

mighty | See blonde.

Mit Out Sound | When a take is recorded. Translates to “without sound.”

MOS | See Mit Out Sound.

Musco lights | An array of permanently crane-mounted HMI lights. Can flood vast outdoor areas with high levels of light.

muslin | A lightweight fabric that is very effective for reflecting light across a set. Unbleached muslin is good for warmer tones of light.

N

nets | A bobbinet on a frame used to cut the lighting intensity by either a half stop or a full stop without changing its quality or color temperature.

nook | The smallest size of a broad lighting fixture.

O

Obie | A small light on top of a camera that is reflected into the character's eyes. Named after movie star Merle Oberon.

omni-lite | Short for omni-directional and same as a Lowel-lite. This is a highly versatile, compact, open-faced fixture that casts light in all directions. Usually takes a 500-watt tungsten bulb.

open reflector light | See open-faced.

open-faced | The simplest form of electrical light. contains a bulb and a reflector but has no lens. Efficient, inexpensive and ideal bouncing light off ceilings, shining through diffusion screens, or lighting backgrounds.

overhead stands | See highboy.

overheads | Framed, diffusion material that covers a very large area. Some are big enough to cover a sound stage ceiling. Come in various sizes such as 8'x8' (8by) and 12'x12' (12by).

P

PAR Can | Metal, can-shaped housing for PAR lights.

PAR lights | Parabolic Aluminized Reflector (PAR) lights that create a focused, powerful beam of light.

parallels | Temporary scaffolding used as a platform for the camera, lighting, or other rigging.

platypus | See quacker.

practical | A light source that the audience can see in the frame, for example, a bedside table lamp, candles, office strip lights, etc.

"push the baby forward" | Bring the 1000-watt (1K) light closer to the subject.

Q

quacker | A duck-billed clamp used to hold large boards and planks in the air.

R

"ready to go for a take, pictures up, places everyone, ready to shoot" | See "rolling."

recce | Derived from the French verb reconnaître and often called a site survey or tech scout in America. It involves visiting a location to evaluate its viability for filming and in particular checking for lighting, acoustics, accessibility, and power availability before production begins.

redhead | An open-faced 1000-watt (1K) lighting unit, usually with red housing (hence the name redhead).

reflective light | The amount of light reflected off a subject. Readings are taken with a camera meter. See also incident light (opposite).

reflector | Any specialized surface that can bounce or redirect light, for example, a white card. Can be bought as circular reflectors or square boards in assorted colors.

"reset and cut" | When the director says cut, all recording stops, and the take is over. When the director says "reset," the actors reset to the beginning of the take, but recording resumes.

rim | A hard backlight that is brighter than the key light. Placed behind a subject to create a bright outline.

riser | A cylindrical metal device placed between the dolly head and the camera base or on a pre-built platform. Used to raise the set, camera, or lights.

"rolling" | What the camera operator says when they begin recording on the camera. Comes from film, which rolls through the camera.

rough in | First placement of the lights before they are readjusted.

S

scoop | A simple, lightweight fixture with a tungsten halogen bulb housed inside a dome-like metal fixture which acts as a basic reflector. Heats up very quickly.

scrim | A metal-gated circle placed inside a light. Used to diffuse harsh sunlight when shooting exteriors or to reduce the intensity of or soften the light source. Typically quite large: either 10'x10' or 20'x20' in size. Come in single/half/green or double/full/red, depending on the light being diffused.

script supervisor | Also referred to as the continuity script supervisor or "scripty." This person requires a keen eye for detail, making sure the dialogue, story and visual details (e.g. props, clothing) are consistent from one shot to another and thus enabling the editor able to cut seamlessly during post-production.

senior | A 5000-watt (5K) Fresnel lighting unit used to create a powerful, controllable beam of light.

senior stand | A braced junior stand rugged for large lights such as a 5K, a 10K, or a big eye. A big eye is slang for a huge 10K-20K Fresnel light, manufactured by the company Mole-Richardson, that emits an immense, adjustable beam of light.

shiny boards | A grip reflector used to reflect or aim sunlight to provide a key or fill light, creating a softer, more even illumination.

shot bag | A heavy bag filled with sand, lead, or metal shot; looks like a sandbag. Used to weigh down and stabilise stands.

showcard | A piece of white artist's cardboard that is easily cut and formed. Used as a light reflector or for making other special rigs.

siamese | A splitter that divides a power line into two parts.

sider | A small flag or cutter used to block or control spill light, i.e., unwanted light escaping from the sides of a lighting unit.

slate | The black-and-white board seen at the beginning of a take with the scene and shot number on it. Used to synchronize audio and video in post-production.

snoot | A tube or cone-shaped attachment that controls the radius and direction of a light beam.

“soft sticks” | Said when there is a close-up that needs to be slated. Reminds the individual not to clap the slate too hard in front of someone.

softbox | A cloth frame that mounts onto a light. Transforms harsh, bright lights to soft lighting for beautiful settings. Good for lighting in direct positions.

sparks | Crew members who are considered electricians, although not all of them are trained as electricians. Responsible for the movement and set-up of various pieces of lighting equipment. May also lay electrical cables, wire fixtures, install color effects or image patterns, focus the lights, and assist in creating effects or programming sequences.

specular | A term used to describe a highly directional, focused light. Often perceived as a very hard light.

“speed, speeding” | A common phrase used to indicate that 5 seconds of recording has elapsed or to take 5 seconds for the capstan heads on video tape to wind around. Is in vogue for digital.

Spider box | A portable power distribution box, also known as a convertible 6-way stage box. It is a localized power hub, breaking down a larger power feed into multiple 120V or 240V outlets for lighting and sound equipment.

“spike that spot” | A request to use gaffer tape to mark an X on the spot where the talent needs to stand.

“stand up" / "stand down” | Raise or lower the stand that the light is mounted on.

sticks | Another word for a tripod (both the legs and the head) on a film set.

stinger | A single (hot) extension cord for occasional use.

“strike the baby” | Command to switch the 1000-watt (1K) light on and off in the USA.

“strike the junior” | Command to switch the 2000-watt (2K) light on and off in the USA.

“striking” | Said when turning on a light on a set in the USA. Warns the crew not to look directly into the light when it is switched on and to warn them when it is being switched off.

T

take down | Reducing the light on an object by means of nets, scrims, dimmers, or wasting light.

tenner | A standard studio 10000-watt (10K) lighting unit. Distinct from a baby 10K or a big eye, which are both 10K lighting units.

“that’s a purchase” | The light is now set, and there will be no changes or moves made.

track | A steel or aluminum track that the dolly glides along to create smooth camera movements. The track is laid level by the grips across all types of terrain using apple boxes and wedges.

turtle | A flat, on-the-floor mount for large lights with a junior receiver.

tweenie | Slang for a 650-watt Fresnel lamp.

W

“walk the baby back” | Bring the 1000-watt (1K) light back from the subject.

wash | Provides broad, even illumination across an area.

waste | Shining a light on an object, then slowly turning it away so that some of the light misses or falls off the object.

wedges | Wood wedges cut from 2x4 lumber. Used for leveling and stabilizing. Small timber triangles can be used to level the dolly track.

Z

Zeppelin | A puffy case that goes over a microphone to cut down wind noise.

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Student Templates, Examples, & Reference Documents

Library of Student Resources

Resource Title	Chapter	Link to document	Alternate format (if applicable)
"Art by Firelight?" by Needham, et al.	00_Preface	PDF	Source
Rules for Dismissal	01_Lighting Roles & Responsibilities	PDF	
Movie Budget Template	01_Lighting Roles & Responsibilities	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Intimacy Coordination Guide	01_Lighting Roles & Responsibilities	PDF	Source
Breaking Down the Script PPT	01_Lighting Roles & Responsibilities	Google Slide (view)	
How to Slate PPT	01_Lighting Roles & Responsibilities	Google Slide (view)	
Lighting Safety	02_Safety on Set	PDF	
Fog & Haze Safety Bulletin	02_Safety on Set	PDF	
Risk Assessment Template	02_Safety on Set	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Safety Checklist Template	02_Safety on Set	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Safety Awareness Bulletin	02_Safety on Set	PDF	
Safety Committee for the Motion Picture and Television Industry	02_Safety on Set	www.csatf.org	
CSATF General Code of Safe Practices	02_Safety on Set	www.csatf.org	
The Industry Wide Labor Management Safety Committee bulletin # 8	02_Safety on Set	www.csatf.org	
Ursa Mini Cheat Sheet	04_Lighting & Visual Composition	PDF	
Cameras and Sensors PPT	04_Lighting & Visual Composition	Google Slide (view only)	
Luma and Chroma PPT	04_Lighting & Visual Composition	Google Slide (view only)	
Basic Light Plot Template	08_Lighting Plots & Recces	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
The Recce PPT	08_Lighting Plots & Recces, 01_Lighting Roles & Responsibilities,	Google Slide (view)	
Lighting Plot Example	08_Lighting Plots & Recces	PDF	
Film Noir Light Plot	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Location Agreement Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
DOODs Cheat Sheet	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)

Resource Title	Chapter	Link to document	Alternate format (if applicable)
Extended Call Sheet Template	09_Film Noir & Production Case Study	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
General Crew Release Form Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
General Cast Release Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Production Call Sheet Template	09_Film Noir & Production Case Study	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
Simple Shot List Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Simple Call Sheet Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Storyboard Template	09_Film Noir & Production Case Study	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
DOOD template	09_Film Noir & Production Case Study	Google Sheet (this link will prompt you to make a copy)	Google Sheet (view only)
Butterfly Lighting Plot	10_Butterfly / Paramount Lighting	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Rembrandt Lighting Plot	11_Rebrandt Lighting	Google Doc (this link will prompt you to make a copy)	Google Doc (view only)
Firearm Safety	14_Lighting for Weaponry	PDF	
Piercing Props Safety & Data Sheet	14_Lighting for Weaponry	PDF	
RED Scarlet XDragon Black Balance Instructions	15_Green Screens	PDF	

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Individual Research Seminar Instructions & Rubric

Prepare a research presentation lasting up to 10 minutes regarding your chosen lighting fixture, accessory, or pieces of grip equipment.

Below is the **minimum** information required:

- Name of instrument
- Type of instrument
- Nickname (if applicable)
- Wattage and voltage, which can be used (for light fixtures)
- History of instrument, if any
- Special considerations
- Circumstances for use

Bring in diagrams, the real instrument or a photo of one, an example from a movie clip, and anything you can discover that can teach the rest of the class about your research.

Rubric

Information 40 points	10 Very little research or knowledge imparted to class	30 Needs improvement as knowledge/information missing	35 Good but missing some aspects of knowledge in places	40 Excellent information demonstrate in depth knowledge of instrument
Presentation 30 points	10 Poor: just text or no Powerpoint utilized; typing errors or difficult to read	20 Powerpoint could be improved as to layout/readability lacking/errors, eye contact and body language needs practice	25 Good but some improvements needed either with Powerpoint readability and/or body language and eye contact	30 Excellent; easy to read/hear; good eye contact and body language during presentation
Diagrams or instrument itself 20 points	5 No diagrams or instrument shown	10 Either a diagram or instrument missing but has one of them	15 Has several diagrams but some hard to see/read and/or instrument incorrect	20 Excellent has diagrams clearly viewable and instrument if available
Photos of instrument 5 points	1 No photos used	2 Has one or two photos but difficult to see	3 Has several photos but one may be difficult to see	5 Excellent photos used and viewable

Examples from Movie clip 5 points	1 No video clips used	2 Video clips used but not good examples; too long/short	4 Good video clips used but audio/image needs improving	5 Excellent video clips, viewable, audible

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Individual Research Seminars Instrument List

Select an item from the list to present on your assigned date.

1. Fresnel
2. Lowell-lite
3. HMI & ballast
4. Diva
5. Scoop
6. Broad
7. Cyc
8. PAR
9. Dedolight
10. C-stand
11. Scissor clamp & obie
12. C-clamp & suction cups
13. Cardellini & Matthellini clamps
14. Platypus clamp & stingers
15. Mafer clamp & China balls
16. Pony clamp & baby stands
17. Apple box, & combo stands
18. Milk crate, CTO & CTB gels
19. Baby pin, magenta & plus green gels
20. Flags (topper/bottomer/sider) & dots
21. Scrims & reflectors
22. Silks

This list can be amended to suit class numbers and needs of the instructor.

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Individual Composition Assignment & Rubric

Introduction

For this assignment you will record 5 separate, fixed shots according to the compositional rules listed below.

- Rule of thirds
- Picture-in-picture
- Dutch tilt
- Shallow depth of field
- Pull and rack focus

You can use your classmates/friends as actors but the shot itself must be taken by you. If there are no actors, you can use subjects such as landscapes, inanimate objects etc. However, there must be some form of life/movement inside the filmic frame. You can use whatever lens size/filter might be appropriate to the mood/tone/subject. You do not have to record sound; sound is not part of this assignment.

Technical Specifications

- Use the 7D camera, 1080p 24 fps
- Format is to be 1920 x 1080p.
- Frame rate to be 24fps
- Codec to be H.264.

Shot List

- 1st shot: rule of thirds,
- 2nd shot: picture-in-picture,
- 3rd shot: triangular rule
- 4th shot: dutch tilt,
- 5th shot: shallow depth of field, then a pull and rack focus contained within it.

Further Guidelines

- Each shot should have a different location, subject or character/s and action.
- Every shot should be on a tripod.
  - No pans, tilts, or any other type of camera movement is to be used.
- Each shot should be slated with relevant information. This should be in focus and easy to read.
- Each shot should have 5 seconds of pre-roll and 5 seconds of post-roll. The action should be at least 5 seconds in length but no longer than 15 seconds in length (not including the pre- and post-roll).
- Every shot should be accurately exposed,
- Every shot should be accurately color balanced to suit the mood and tone of the shot.
- Every shot should be in focus in the appropriate area/s.

Post-Production Steps

1. Import shots into Adobe Premiere CC or a similar software
2. Edit shots in order on the timeline.
3. Create a title card at the start with your name and before each shot.
4. Please make sure the SLATE is on each shot.

5. Render them before exporting to Codec H.264

Rubric

Criteria	Achievement Level 1	Achievement Level 2	Achievement Level 3	Achievement Level 4
Composition **25% (5% each shot)**	5 Needs more help developing composition on all shots	10 Recognizes composition but requires reframing and cropping on 3 or more shots	20 Utilizes good composition competently for a balanced shot but either a little cropping or slight reframing required on 1 or 2 shots	25 Utilizes good Composition creatively; no changes required on any shots
Exposure **25%**	5 Unable to obtain correct exposures on all shots. Needs more experience	10 Many changes needed for correct exposure on 3 or more shots e.g. such as use of filters	20 Obtained exposure competently but a few minor changes required on 1 or 2 shots	25 Obtained excellent exposure – no changes needed on any shots
Focus **25% (5% each shot)**	5 Unable to use focus ring. Needs more experience	10 3 or more shots out of focus when should be sharp	20 1 or 2 shots out of focus when should be sharp	25 All shots correctly focused according to composition
White balance **20% (4% each shot)**	1 Not white balanced correctly on any shots	5 3 or more shots incorrectly white balanced	15 1 or 2 shots incorrectly white balanced	20 All shots correctly white balanced
Use of clapperboard **5% (1% each shot)**	1 Clapper not clearly seen poor vocal/ written slate	2 3 or more shots where clapper not clearly seen, and/or poor verbal/written slate	4 1 or 2 shots where clapper not clearly seen and/or poor verbal/ written slate	5 Clapper correctly used in all shots. Clearly seen and good verbal and slate marking

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Satan's Set

Satan's Set is a practical exam for an upper level, camera and lighting class. It is designed to demonstrate students' safety on set and what they have learned in class up to that point, usually mid way through the term. I hold the exam in a very large production studio and it lasts approximately 45-60 minutes. After the exam, I review the answers with the class, discussing each error found. This exercise reinforces safety, design, and lighting techniques. It also demonstrates how attention to detail is extremely important on a production set. Lastly, it is a lot of fun! Since the exam often falls near Halloween, I encourage the students to come in costume for the exam, giving a couple of extra points if they do so. Some come as the devil himself.

I spend about an hour setting up this set from hell, creating approximately 30 major errors including, but not limited to:

- messy cabling,
- a dodgy tripod,
- cups of water near the lights (lights are not switched on btw),
- sticky tape on barn doors instead of C-45's
- and so many more.

Some are less obvious than others. (e.g., camera settings in French) Also contained on *Satan's Set* are an incorrect composition, completely incongruous lighting technique and dreadful *mise-en-scène*. If students can identify these errors, it demonstrates that they know, understand. and hence follow safety guidelines on a production set.

The instruction sheet in the following appendix provides the assignment scenario from which to base many of the errors. I provide each student with a form containing a 2 columned table with 25 separate lines. The student should log the mistakes and why they are mistakes. Also, I inform them that being messy is not a reason.

Grading:

The exam is worth 100 points total:

- 2 points for first 25 mistakes found
- 2 points for correct reason (e.g., saying messy is not a reason)

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Satan's Set Scenario & Instructions

SATAN'S SET – MID TERM EXAM 100 points

2 points for the first 25 mistakes found

2 points for correct reason

Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Video online

You are the AD second unit. The director has asked you to set up a medium shot depicting a romantic couple at sunset. Camera to be URSA, 24fps 1080p using Rembrandt lighting technique.

Please find at least 25 mistakes in this set up.

Use the form on the next page to write down your answers. Log each error in the first column and in column 2 explain why it is an error.

PRINT CLEARLY If I cannot read your print you do not get the point/s

PRINT YOUR NAME.....

	Error	Reason
1		
2		
3		
4		
5		

	Error	Reason
6		
7		
8		
9		
10		
11		
12		
13		
14		
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Chapter 11 Low Lighting Assignment & Rubric

Introduction

In the studio, using URSA mini 4K, light and shoot **one** low lighting shot of your choice from film noir, butterfly, Rembrandt or Silhouette techniques

You can use your classmates/friends as actors but the shot itself must be taken by you. There must be some form of life & movement inside the filmic frame. You can use whatever lens size or filter might be appropriate to the mood, tone, and subject. You do not have to record sound; sound is not part of this assignment.

Technical Specifications

- Format is to be 4K
- Frame rate to be 24fps
- Exported Codec to be H.264.

Further Guidelines

- The shot should utilize a correct compositional rule of your choice, such as rule of thirds, dutch tilt, etc.
- The shot should be on a tripod.
  - No pans, tilts, or any other type of camera movement is to be used.
- The shot should be slated with relevant information. This should be in focus and easy to read.
- The shot should have 5 seconds of pre-roll and 5 seconds of post-roll.
- The action should be at least 5 seconds in length but no longer than 15 seconds in length (not including the pre- and post-roll).
- The shot should be accurately exposed according to the chosen lighting technique
- The shot should be accurately color balanced to suit the mood and tone of the shot.
- The shot should be in focus in the appropriate area/s.

Post-Production Steps

- Import shot into Adobe Premiere CC or similar software
- Color grade according to the style/mood/tone/lighting technique
- Put the title card at the start with your name and assignment title.
- Please make sure the slate is on the shot for me to see.
- Render them before exporting to Codec H.264
- Make sure it is 4K format.

Rubric

Criteria	Achievement Level 1	Achievement Level 2	Achievement Level 3
Style	10 Needs more help with chosen style. No motivation for direction of light, shadows. Unable to determine chosen style. No sense of depth. Poor use of composition. No life or movement inside filmic frame.	20 Improvement needed. Haphazard Light direction, and shadows. Composition needs improving such as slight cropping. Life/ movement inside filmic frame needs improving.	30 Excellent use of lighting direction. Motivation clearly matches style. Shadows correctly utilized to highlight or disguise items in filmic frame. Life/ movement excellent inside filmic frame. No changes needed to composition.
Texture	10 No attempt to use lighting for texture, or sculpting of subject. Texture does not match the chosen style	20 Improvement needed. Haphazard lighting for texture, or sculpting of subject. Texture tries to match style	30 Excellent use of lighting style matches the texture and subject
Color	10 Colors do not suit style of lighting/motivation/mood and deflect from making sense of the image. Subject very difficult to discern for audience. Poor color balance.. color grading not performed.	20 Needs improvement. Colors haphazard for suit lighting/ motivation/mood and deflect from making sense of the image. Subject difficult to discern for audience. Color grading could be improved.	30 Excellent use of colors matches style of chosen lighting/motivation/mood and help make sense of the image Subject clearly defined for the audience. Good color balance and color grading.
Illusion of Reality	5 Lighting does not look believable. Does not focus viewer attention to specific details/subject within the filmic space.	10 Needs improvement Lighting believable in some parts of filmic frame. Haphazard focus of viewer attention to specific details/subject within the filmic space	20 Excellent lighting is believable. Focus' viewer attention to specific details/ subject within the filmic space
Exposure/ Intensity	5 scene is too dark or too light to determine motivation/what is going on in scene and lacks visual design and no attempt at pleasing aesthetics	10 Needs improvement some parts of scene either too dark/light and plain visual design/aesthetics	20 Excellent exposure according to style of lighting chosen. Scene has visual beauty.

Criteria	Achievement Level 1	Achievement Level 2	Achievement Level 3
Misc.	5 No clapper board used. Pans and tilts used No tripod used or unstable Pre roll, post roll and shot length not adhered to Incorrect format and/or codec and/or frame rate.	10 Clapperboard used but incorrectly e.g. information unable to see Unstable tripod Pre roll, post roll and shot length incorrect either too short or too long One incorrect format, codec or frame rate.	20 Excellent use of clapperboard. Pre roll, post roll and shot length 5-15 seconds adhered to. Stable tripod. Correct format, codec and frame rate.

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From Script to Screen

- In small groups of 4 or 5, students will create, shoot, and edit an original, short narrative script.
- Student roles will be allocated according to student requests.
- **No dialogue** is required for this. Synchronized sound is not part of this assignment.
- The URSA Mini 4.6K camera is to be used for this assignment.
- You can use your classmates/friends as actors
- Students will have written a short script during this semester.

Script Elements

- Length of script: 1-3 minutes (1-3 pages excluding cover page, title, and tagline)
- Cover page, title, and tagline should be included as pages 1, 2, and 3
- Do not go over 3 minutes in length
- Basic three-act structure
- Script needs to **show not tell**.
- **One** protagonist
- **One** antagonist
- Please keep minor characters to one or two and only if absolutely necessary
- Locations should be 90% indoors
- Every shot is to be perfectly composed, exposed, focused, and color balanced.
- Production notebook to be submitted and is worth 5% of this overall grade

Pre-Production

- Your group should create a basic production notebook as part of pre-production.
- Ensure the basic elements are covered before shooting.
- Ensure you have listed all of your equipment, shots, storyboard, cast, crew, contact details, etc.
- Ensure costumes, etc., are prepared for the shot.
- Check the Safety on Set guidelines as per chapter 2.
- The first assistant director must create a safety checklist and conduct a safety meeting before shooting.
- Send your cast and crew the call sheets in a timely fashion and also 24 hours prior to the actual shooting date.
- Appropriate safety meeting records and safety data sheets need to be kept in the production notebook.

Camera Settings

- The URSA Mini or RED camera is to be used for this assignment.
- Format is to be 4K, 16:9, Apple ProRes 4:2:2 HQ, 10 bit.
- Frame rate to be 24 fps
- Exported Codec to be H.264
- **The camera should be placed on a tripod (do not use handheld shots)**
- Tilts and pans of the camera are to be minimally used and only to enhance story, character, or mood.
- Do not zoom in or out unless you are performing a trombone or reverse trombone technique.

Shooting

- Each shot is to be **slated** with relevant information.
- The slate should be in focus and easy to read. You can use a free downloadable slate or a plastic one from the cage.
- There should be 5 seconds of pre-roll and 5 seconds of post-roll for each shot.
- Each shot is to be accurately lit and exposed according to the story/character/action mood and tone.
- Each shot should be accurately color balanced to suit the mood and tone of the shot.
- Each shot should be in focus in the appropriate areas of the filmic frame.

Production

- Follow the production notebook to ensure the basic elements are covered before shooting. Do not shoot until you are sure all elements have been assembled prior to each shot/scene/location needs.
- Ensure all your equipment, shot lists, storyboards, contact details, costumes etc. are prepared for each shot/scene/location
- Make sure you have secured the appropriate location permits with signatures.
- Make sure the First Assistant Director conducts a safety meeting with cast and crew prior to shooting **each day** and **each location**. Appropriate safety meeting records and safety data sheets need to be kept in the production notebook.
- **Rehearse the shot/action** before you record.
- Do not shoot shots lasting more than 60 seconds.
- Record three takes at most unless there are extreme difficulties.
- Ensure your location is left in the manner in which you found it.

Post Production

Each student should edit their own version from footage, adding appropriate title cards, credits, SFX, color grading, sound effects, atmos, music to enhance the viewers' experience.

- Ensure you render them before exporting to Codec H.264
- Make sure it is 4K format.
- File name should include name and name of film.

Rubric

Criteria	Achievement Level 1	Achievement Level 2	Achievement Level 3	Achievement Level 4
Narrative and structure	13 Narrative unclear or confusing. Poor choice of character/ subject. Needing many improvements, too long or too short	18 Narrative needing improvements/and or structure too loose Unable to get good footage due to difficult subject/ character too long or short	23 Good storyline, some improvements needed for structure. Good footage but topic superficial may be too long or short	20 Strong storyline with clear beginning, middle and end

Criteria	Achievement Level 1	Achievement Level 2	Achievement Level 3	Achievement Level 4
Composition	13 No style adhered to or attempted. Poor composition, out of focus, inadequate exposure, color balance. Poor project.	18 Mixed style which needed improvement Some compositions are either out of focus, inadequate exposure, or color balance. Needs improvement	23 Good use of style with only one or two composition/focus/exposure errors. Minor changes needed.	40 Excellent composition, focus, exposure. Memorable images.
Lighting	15 No light plot submitted Lighting over or/underexposed poor color use no attempt at style motivation, mood lighting does not look believable. Does not focus viewer attention to specific details/subject within the filmic space	20 Light plot not submitted or needs improvement Lighting believable in some parts of filmic frame. Haphazard focus of viewer attention to specific details/ subject within the filmic space	28 Good lighting plot. Some improvements needed on exposure/color/style/mood/ motivation. Might be fairly believable according to style. Almost maintains focus of viewer attention to specific details/subject within the filmic space	50 Excellent lighting is believable. Focus' viewer attention to specific details/ subject within the filmic space Excellent exposure, colors suit style and mood/ motivation
Post production	5 Unsatisfactory no attempt at rhythm, pacing, poor sound and color corrections	10 Some changes needed in areas such as rhythm, pacing, sound and color corrections	13 Good rhythm, pacing, sound and color corrections with minor changes needed.	30 Excellent rhythm, pacing, sound and color corrections with no changes needed.

Criteria	Achievement Level 1	Achievement Level 2	Achievement Level 3	Achievement Level 4
Peer Review	1 Overall D or less on 90% of all peer reviews	3 Overall C+, C or C- on 90% of all peer reviews	4 Overall B+ B or B- on 90% of all peer reviews	10 Overall A or A- B on 90% of all peer reviews

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Student Peer Evaluation Sheet

- Evaluate yourself and your team members.
- This will be confidential; evaluations will not be shared with other team members.
- Aggregated scores count towards the total grade of the Final Group Project.

Production Team Name:

Self Evaluation:

Your name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ I did fair share of work

___ I was cooperative/did agreed upon task

___ I contributed to ideas/planning

___ I was available for communication

___ I was positive, helpful

___ I contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give yourself?

Team Member 1 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 2 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 3 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 4 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**

- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 5 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 6 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 7 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 8 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 9 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

Team Member 10 Evaluation

Name:

- **1 (rarely/never)**
- **2 (occasionally/sometimes)**
- **3 (all/most of the time)**

___ did fair share of work

___ was cooperative/did agreed upon task

___ contributed to ideas/planning

___ was available for communication

___ was positive, helpful

___ contributed to overall project success

Other comments:

What **grade** (A, B, C, D, F) would you give this member?:

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