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Image Makers: Designers

LIGHTING AND SOUND

> I feel that light is like music. In some abstract, emotional, cerebral,
> nonliterary way, it makes us feel, it makes us see, it makes us think,
> all without knowing exactly how and why.[1]
>
> Jennifer Tipton, Lighting Designer

THE LIGHTING DESIGNER

In today's theatre, lighting, sound, and computer technologies affect what we see, how we see, how we hear, how we feel, and often what we understand. As areas of theatrical design, lighting and sound, along with the new "machines," are essential to the modern stage's theatrical effectiveness.

Stage lighting is a powerful theatrical tool to focus an audience's attention, enhance understanding, and give aesthetic pleasure. It is sometimes surprising to learn that the "lighting" designer emerged in the theatre well before the invention of electricity.

Background

The Greeks called their theatres "seeing places." These were outdoor theatres, and performances took place chiefly during daylight hours, but not without some attention to lighting effects. Playwrights, who were also the earliest directors, called for dramatic effects with torches, fires, and even sunlight. Aeschylus in *Agamemnon*, which tells the story of the King's return at the close of the Trojan War, begins with a Watchman standing atop the palace to watch for beacons shining from distant mountaintops that will signal Agamemnon's return to Argos. Most interpreters think that the Watchman's speech begins virtually in the early morning mist and that his recognition of the signal flames coincides with the actual sunrise over the Theatre of Dionysus. Although the material of legend, the effect would be spectacular. Because the plays lasted throughout the day, it is also logical that the red rays of sunset in the Attic sky could have simulated the destructive flames of the burning Troy, or even the cessation of military or personal struggles in the last rays of sunlight.

Again, in the medieval outdoor theatres, torches, cauldrons of flame and smoke, and reflecting metals focused the audience's attention on im-

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portant events in Biblical stories. As productions of morality plays during the late Middle Ages moved indoors within manor houses and public halls, oil lamps, candles, and reflecting colored glass provided illumination and effects.

By the time of the Renaissance, Italian painters and architects in Italy and France were creating general illumination with tallow or wax candles in chandeliers and wall sconces; spectacular effects with oil lamps, panes of colored glass illuminated from behind, colored lanterns, and transparent veils of cloth; and astonishing outdoor displays of fireworks to climax festival events in Florence or Versailles with incendiary brilliance.

Between 1660 and 1800 in England, the general practice was to light the onstage candles before the curtain opened and to snuff them out when the play ended. Chandeliers above the auditorium remained lighted from start to finish. The auditorium was not darkened, so spectators continued to attend theatres as much to be seen as to give attention to the actors and the plays. Diarist Samuel Pepys, in the mid-seventeenth century, complained of candle wax dripping onto spectators and of the candlelight hurting his eyes.

There were other inventions such as footlights, placed along the apron of the stage around 1672 to give increased illumination to the actors standing there. In 1785, Argand, or "patent," oil lamps produced brighter and steadier light and replaced candles. But the introduction of gas, the "gas table," and limelight (or calcium or Drummond light, the prototype of the spotlight or follow spot) in the mid-1880s provided for the first time better general illumination and more realis⁺   ⁻hting effects on European and American stages. A single operator at a gas table, ⁻⁺ ⁻⁻⁻⁻able to a modern control console, could adjust a valve and increase or decrease the intensity of a single lamp or control all lights from a single position in the same manner as a modern dimmer system.

Nevertheless, gas lighting had its drawbacks, not the least of which were unpleasant fumes, intense heat, and the danger of live flame onstage, not infrequently resulting in the burning down of such theatres as the Drury Lane in London. In addition, the heat, smoke, and carbon pollution from gaslights caused the deterioration of scenery and costumes and affected the eyes of actors and spectators alike. The incandescent lamp, invented by Thomas Edison in 1879, was almost immediately adopted as the means of lighting the entire stage. It was an answered prayer to end the disastrous theatre fires caused by open gas flames.

Electricity transformed overall possibilities for lighting design in the theatre. It made possible complete control of a range of intensities and colors; it provided the ability to lighten or darken different areas of the stage; it provided a source of mood for the actor and atmosphere for the play; and it also made possible spectacular effects. In 1881, London's Savoy Theatre was the first to be fully lighted with electricity.

Enter the modern lighting designer. At the turn of the twentieth century, Swiss designer Adolphe Appia understood the

An early lighting control board at the Paris Opera, 1893, with the operator beneath the stage. Note also the prompter seated at the front of the stage.

Mary Evans Picture Library

LIGHTING DESIGNER
Jennifer Tipton

Jennifer Tipton, born in Columbus, Ohio, grew up in Knoxville, Tennessee, where she briefly studied dance with Martha Graham and José Limón. A graduate of Cornell University, she eventually found her way with the help of designer Thomas Skelton into a career as a lighting designer for choreographers Paul Taylor, Robert Joffrey, Jerome Robbins, and Twyla Tharp.

Beginning in the late sixties, she worked consistently as a lighting designer for regional theatres, for dance and opera companies, and on Broadway. In 1976, she won the Drama Desk Award for lighting design in Ntozake Shange's *for colored girls who have considered suicide/when the rainbow is enuf* and Antoinette Perry "Tony" Awards for *The Cherry Orchard* at Lincoln Center in 1977 and for *Jerome Robbins' Broadway* in 1989. She designed lighting for Robert Wilson's *the CIVIL warS* at the American Repertory Theatre, Cambridge, Massachusetts, and for the 1997 revival of Eugene O'Neill's *The Hairy Ape*, starring Willem Dafoe, for the Wooster Group, New York City. In 1989, she again received the Drama Desk Award for lighting design in *Jerome Robbins' Broadway*, *Long Day's Journey into Night*, and *Waiting for Godot*. In 1991, she made her directing debut at the Guthrie Theater, Minneapolis, with *The Tempest*. She teaches lighting design at the Yale School of Drama in New Haven, Connecticut.

Tipton's use of light is characterized by "textured and sculptured space" and by use of a palette based on white. She summarizes the essence of the lighting designer's art by saying, "While 99.9 percent of an audience is not aware of light, 100 percent is affected by it."[2]

Stage lighting controls what we see and often what we hear. Jennifer Tipton's lighting design for the 1977 production of *Agamemnon* at Lincoln Center Theater, New York City, creates a somber atmosphere while focusing attention on the bodies of Agamemnon and Cassandra lying before the palace doors.
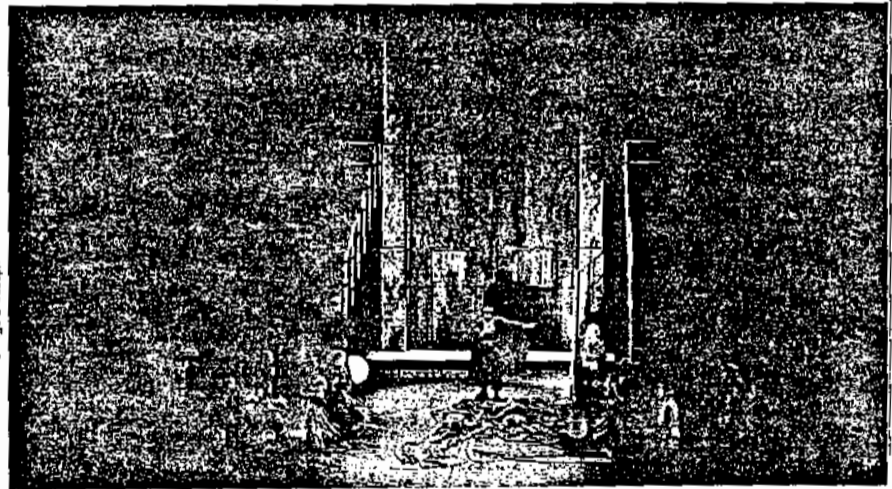
Jennifer Tipton says that the directors who have meant the most to her are the ones who have stimulated her to use darkness. Andrei Serban, who directed the revival of Chekhov's *The Cherry Orchard* for which Tipton won her first Antoinette Perry "Tony" Award, insisted on "darkness." He said, "No, darker, darker, darker, darker." "And it got very dark, so people were almost invisible," Tipton said, "which made voices ring out even more clearly than when the lights were on. The fact that he [Serban] had made me go that dark at that moment meant that the whole composition over time changed. . . . Because the darkness was there, the brightness had to be brighter, and there had to be other darker moments. Serban didn't tell me to do that. I just did it. It had to be. Any one thing you do, any change you make, affects everything in the whole production."[4]

artistic possibilities of lighting for the theatre. In *Music and Stage Setting* he argued that light should be the guiding principle of all design and set down modern stage lighting practices. He believed that light could unify or bring into harmony all production elements, including two- and three-dimensional objects, actors, and inanimate objects, shapes, and things. Appia established light as an artistic medium for the theatre and defined the role of the modern lighting designer.

The Art of Light

Pioneering American designer Jean Rosenthal defined lighting design as "imposing quality on the scarcely visible air through which objects and people are seen."[3] One rule of lighting maintains that *visibility* and *ambience* (the surrounding atmosphere) must be inherent to the total theatrical design, including scenery and costumes. The light designer's tools, other than the instruments themselves, are form (the shape of the lighting's pattern), color (the mood achieved by filters— thin, transparent sheets of colored plastic, gelatin, or glass—or by varying degrees of intensity, or by both), and movement (the changes of forms and color by means of dimmers, motorized instruments, and computerized control consoles).

Gypsy, with Bernadette Peters, 2003 revival directed by Sam Mendes, sets and costumes by Anthony Ward, and lighting by Jules Fisher and Peggy Eisenhauler.

LIGHTING DESIGNERS
Jules Fisher, Peggy Eisenhauer, and Tharon Musser

Jules Fisher and **Peggy Eisenhauer** are among the American theatre's leading light-
ing designers. Educated at Pennsylvania State University and Carnegie Institute of Tech-
nology, Fisher has designed lighting for Broadway's *Hair, Pippin, Jesus Christ Superstar,
Chicago, La Cage aux Folles,* and *Grand Hotel,* among others. Since 1986, he and Peggy
Eisenhauer (educated at Carnegie-Mellon University) have designed numerous pro-
ductions jointly, including *Victor Victoria; Ragtime; Jane Eyre; Bring in 'da Noise, Bring in 'da
Funk;* and *Gypsy.* Eisenhauer also designed the lighting for the recent revival of *Cabaret.*
In the music industry, her concert production designs have been seen internationally in
twenty-six countries.

Jules Fisher provided the lighting design and production supervision for the 1975
Rolling Stones tour. Today, he is a principal of a theatrical consulting firm, Fisher Dachs
Associates, and also partner in an architectural lighting firm, Fisher Marantz Stone.

Tharon Musser is a graduate of Berea College, Kentucky, and the Yale University
School of Drama. She, like Jean Rosenthal and Jennifer Tipton, did most of her early
lighting work for dance companies. Her Broadway career began in 1956 with José
Quintero's production of *Long Day's Journey into Night,* and since 1971, she has designed
the lighting for all of Neil Simon's Broadway productions. She is credited with lighting
more than 125 Broadway productions, receiving three Antoinette Perry "Tony"
Awards. She is most renowned for her collaborative work with Michael Bennett (di-
rector and choreographer), Robin Wagner (scenic designer), and Theoni V. Aldredge
(costume designer), on *A Chorus Line* which became one of the longest-running pro-
ductions to appear on Broadway. Other Broadway works include *Mame, Follies, A Little
Night Music, 42nd Street, Dreamgirls,* and *Applause.*

The Designer's Process

The lighting designer's first step in the design process is to read the script, giving at-
tention to visual images and noting the practicals, such as table lamps to be turned on
or chandeliers to be used overhead. The next step is to meet with the director and to
confer with the set and costume designers. In these conferences, there are basic ques-
tions about lighting to be asked: What degree of reality does the director want to sug-
gest? Where are the important scenes, or areas, within the stage? What restrictions
are there? What forms, moods, colors, and movements are required by the play and /
or director? Are there special effects needed? Are there backdrops? What practicals are
required?

When directing the Broadway revival of *Gypsy* with Bernadette Peters as Rose, the
indomitable mother, Sam Mendes asked designers Jules Fisher and Peggy Eisenhauer

to light the musical "like a play"—to make the scenes and songs (musical numbers) all of a piece. The only time the lighting was to have a "show-business" look was during the vaudeville scenes.[5] Then, these scenes exploded with light, color, and theatricality.

Armed with information about the production gleaned from the design conferences, the lighting designer creates a design and a light plot. Basically a map, a light plot shows the shape of the stage and auditorium, as seen from above, with the location of the lighting instruments to be used, including type, size, wattage, wiring, and connection to appropriate dimmers or circuits. There are no set rules. Any particular instrument may or may not be used in any location. The only limitations in lighting design are those imposed by the director, by the physical nature of the theatre, by the theatre's available technology, and by safety concerns.

The Designer's Working Methods:
Plotting, Focusing, and Cueing

Today, lighting designers spend, on average, four and a half weeks lighting a show, from early conferences through technical and dress rehearsals. Computer imaging shortens the amount of time lighting designers need to create light plots and also allows designers to preview the effectiveness of the design and share it (and changes) with the creative team.

A finished light plot shows (1) the location of each lighting instrument to be used; (2) the type of instrument, wattage, and color filter; (3) the general area to be lighted by each instrument; (4) circuitry necessary to operate the instruments; and (5) any

Resident sound designer David Remedios creating sound for *Olly's Prison* at the American Repertory Theatre, Cambridge, Mass.

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Robert Wierzel's Lighting for The Cherry Orchard
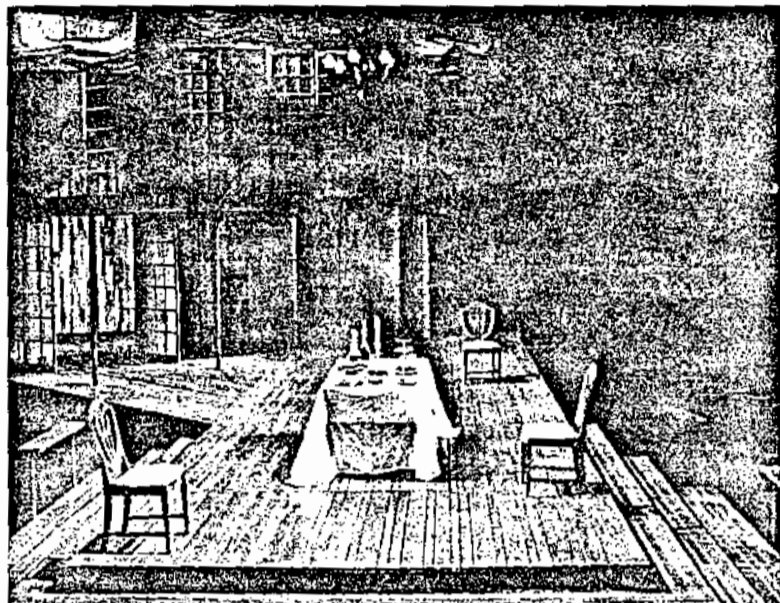
In this scene, the house is open, the window shades are raised, and the lighted chandelier indicates that it is evening.

Robert Wierzel designed the lighting for the PlayMakers Repertory Company's production of Chekhov's The Cherry Orchard in Chapel Hill, N.C., for a thrust stage, with set design by Bill Clarke.

The light plot illustrates the positioning of 250 instruments around three sides of the thrust stage, as well as the overhead chandelier and backlighting behind the rear doorways.
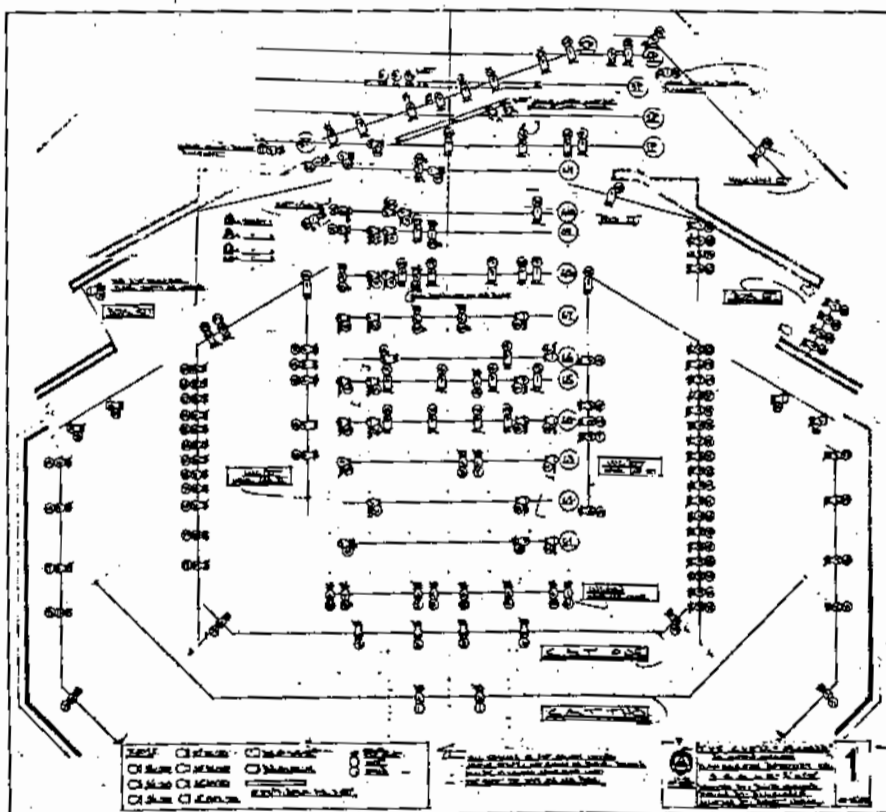
Theatrical Instruments for Stage Lighting

In the Broadway theatre, the new automated lighting instruments have reduced inventory (and rental costs). The motorized beam redirection and color changers solve many of the problems of limited space for hanging instruments in the older New York theatres.

Tools of the lighting designer's trade distribute the light and provide degrees of intensity and color, as well as orchestrations, or movement. Designers can choose from a variety of instruments to do different jobs: spotlights, Fresnels, ellipsoidals, par lamps, motorized lights, strip and border lights, and lasers. In today's theatres, the lighting control console or board with a memory system controls the orchestration of light with preprogrammed cues so that mistakes by the console operator are minimized.

other details necessary for the operation of the lighting system. For example, if a wall fixture is needed onstage so that an actor can "turn on" a light, or an overhead chandelier is required, the position and circuitry of the fixtures are shown on the light plot.

Once the lights specified by the designer are hung in the theatre, they are then focused, that is, pointed in a precise direction to illuminate areas, actors, backdrops, or objects. Hundreds of instruments of different types and wattages, as well as colored gels and dimmers, may be necessary to achieve the desired effects in production. During technical rehearsals, the lighting will be fine-tuned to account for the changing presence of the actors, the costumes, and the scenery.

After the instruments are hung, circuited, angled, and focused, the lighting designer is ready to "cue" the show. A computer-generated cue sheet (or chart of the control console indicating instrument settings and color, with each cue numbered and keyed to the script) is provided in advance to the operators at the control console. During technical rehearsals, the designer asks for various intensities of light and makes changes until satisfied. With each change of lighting, a notation (the light cue) is made that tells how to set the control board and at what point in the stage action to change intensity and color. In the past, these changes were performed manually during each performance. Computers now permit preprogrammed cues (timed changes) to happen smoothly and light cues (often hundreds) for the entire show to be programmed. All is done in consultation with the director.

Special Lighting Effects

Special lighting effects range from the simple to the complex, from mirror balls, searchlights, and lightning to projections, holograms, fireworks, and Tinkerbell's moving light in *Peter Pan*. The plan, budget, and rehearsal with equipment and staff are essential to preparing special effects. The most frequently seen special effects relate to the use of *gobos* (a slide inserted into the gate of a spotlight) to project images of trees, clouds, water, windows, abstract shapes, and so forth; rear projections to throw images on backdrops and screens; color wheels to produce changing color effects; twinkling star effects on backcloths; and moon effects perfected in the Victorian theatre with a box with lights inside. More complicated and costly effects are related to projections, holograms, and lasers.

Commercial devices can be purchased to achieve most effects but require designers and technicians to ensure that they are credible, effective, and safe.

Both lighting and sound designers are usually involved to perfect explosions, fireworks, and sudden apparitions of Shakespeare's ghosts and witches. Today's effects in the theatre and film are notable for their emotional impact on audiences rather than, with some excep the quantity of the "magic."

The Designer's Assistants

The professional lighting designer usually has an assistant designer to help prepare light plots, compile instrument schedules, act as liaison with the theatre's stage electrician and other technicians, and locate special equipment. The assistant designer also aids in supervising the installation of the instruments, compiling cue sheets, and programming the light design.

Most theatres have a master electrician on staff (or a lighting crew head) who works closely with the designer when equipment is installed and instruments adjusted. This individual oversees safety issues, checks and maintains equipment before each performance, and deals with all lighting issues during the run. In the professional theatre, the master electrician and lighting crew are members of the International Alliance of Theatrical Stage Employees union (IATSE). In the nonprofessional theatre, crews are usually made up of students and volunteers.

In all types of theatres, the lighting crew installs, operates, and generally maintains all lighting equipment and shifts any electrical equipment that must be moved during the performance. The control board operator executes the lighting cues during performances and maintains the designer's work. All backstage technicians are responsible to the production stage manager during the performance.

Successful stage lighting complements and unifies the whole without calling attention to itself unless for special effects, for ex-

Death of a Salesman A revival of Arthur Miller's *Death of a Salesman*, with Judd Hirsch and Eva Marie Saint. Directed by Jeffrey Hayden, with lighting by Mary Louise Geiger, Play-Makers Repertory Company, Chapel Hill (N.C.).

Carousel The revival of Richard Rodgers and Oscar Hammerstein II's *Carousel* was directed by Nicholas Hytner, with sets and costumes by Bob Crowley, lighting by Paul Pyant, and sound by Steve Canyon Kennedy. Presented by Lincoln Center Theater, New York City.

© Joan Marcus

ample, or to give greater emphasis to a stage area or to illuminate the ghost of Hamlet's father. It contributes to the play's interpretation with visibility and ambience—controlling what we see (and even hear) and how we see what is taking place onstage.

THE SOUND DESIGNER

The Art of Theatrical Sound

Sound has always been a part of the theatrical event. In earliest times, music (pipes, drums, lyres), choral chanting, and actors' voices provided the chief sound effects. Until the use of disc recordings in the 1950s and more recently, samplers and CD or MD players, sound effects in the theatre were produced live offstage; many—such as gunfire, doorbells, and door slams—still are. In Elizabethan times, "thunder machines" (a series of wooden troughs for cannonballs to rumble down), "thundersheets" (suspended sheets of tin that when rattled made a rumbling sound), and "thunder runs" (sloping wooden troughs for rolling cannonballs down with a large crashing sound at the end) were invented to simulate tremendous storms, such as the storms in *Twelfth Night*, *The Tempest*, and *King Lear*. A cannon was fired from the roof of Shakespeare's theatre to convince audiences of fierce battles taking place, and musicians with trumpets sounded "flourishes," and so forth.

With the invention of electricity, most theatres since 1900 have used electric telephone or doorbell ringers (a battery-powered bell mounted on a piece of wood) and a door slammer (a small door frame and door, complete with knob and latch) to simu-

late real-life sounds. Assistants usually created or supervised these manual "sound effects." But in the 1970s and 1980s, with the development of audio recording, playback technologies, and sound systems, a virtual revolution in sound creation emerged along with a new theatre artist: the *sound designer*.

Theatres today have the capability for both live and recorded sound. Augmented sound, including the actor's voice, is routinely used even in nonmusical performances. Microphones are placed across the front of the stage, or actors wear miniature wireless microphones (usually concealed in their hair or beneath wigs). In the musical *Rent*, there is no attempt to conceal the wireless microphones that the actors wear, and in effect, they become part of the "rock" costumes.

There is much debate today over the electronic amplification of speaking and singing voices in Broadway musicals and nonmusical plays by those who prefer a "more natural" sound. The sound-mixing board has become a permanent fixture in the rear of the orchestra rows of most Broadway theatres and a visual reminder that sound technology is an important part of enhancing the "aliveness" of the theatre.

Rent, with book, music, and lyrics by Jonathan Larson, with actors wearing visible wireless microphones, Broadway, 1996.

The use of live or recorded sounds serves many purposes, for example,

information	location
establishment of locale	foghorns
time of day	chimes on the hour
time of year	birds in springtime
weather conditions	rain or thunder
street sounds	car horns, screeching brakes
realism	ambulance siren, toilet flushing, television sounds
mood	ominous sounds for scary moments
onstage cues	telephones, door knocks
special effects	the "breaking string" at the end of *The Cherry Orchard*, the helicopter sequence in *Miss Saigon*, or the sound of "a terrifying CRASH" as the angel descends at the end of *Angels in America: Millennium Approaches*

Music also serves many purposes, such as evoking mood, establishing period, heightening tension, intensifying action, and providing transitions between scenes and at endings. Today, music is often composed by sound designers for a production and played "live" during the performance, or music is derived from copyrighted

SOUND DESIGNER
Abe Jacob

Abe Jacob pioneered today's theatrical sound design in the American theatre, along with the sound credit on the title page of playbills. He got his start mixing sound for rock-and-roll stars in San Francisco in the 1960s, working with Jimi Hendrix; The Mamas and the Papas; and Peter, Paul, and Mary. His Broadway career began with a preview performance of *Jesus Christ Superstar* canceled because of technical problems. Director Tom O'Horgan, who had worked with Jacob on a West Coast production of *Hair*, asked him to help. His Broadway work continued with Bob Fosse on *Pippin*, *Chicago*, and *Big Deal*; Michael Bennett on *Seesaw* and *A Chorus Line*; Gower Champion on *Mack and Mabel* and *Rockabye Hamlet*. He credits these directors with being among the first supporters of sound design as a legitimate art form. More recently, he championed the cause to acquire union representation for sound designers and technicians in the Broadway theatre within Local 922 of the International Alliance of Theatrical Stage Employees (IATSE).

Jacob also pioneered sound design in opera, serving as sound consultant for the New York City Opera Company. Acknowledging that the opera world is unfriendly to sound designers, he said, "When I started in theatre, it was almost immediate that the critics started m·· ··; comments about the sound in the theatre, and how it was going to bring about ··· ···h of the American musical as we knew it, and they've been saying it ever since. . .и now they're saying it about opera, so I guess," he laughs, "I have the distinction of being able to destroy both art forms."[6]

Sound effects are specifically detailed in Tennessee Williams' text of *A Streetcar Named Desire*: barroom music with a "tinny piano," called a "blue piano," and muted trumpet, street sounds, cathedral bells, cats screeching, rumba music from an onstage radio, trains passing by, polka music, running water in an offstage bathtub, a distant revolver shot, policeman's whistle, Varsouviana music, hot trumpet and drums, cries and noises of the jungle.

recordings (the use rights must be acquired by the theatre and licensing fees paid) and then played through the theatre's sound system. The sound designer oversees the implementation of all of these elements. Sometimes the sound designer is also the musical composer and holds copyright to the music he or she writes for the production. For example, John Gromada was both sound designer and composer for the production of *Camino Real* at Hartford Stage in 1999 and wrote music and lyrics for Betty Buckley to sing.

Whatever the source or quality of the sound, sound designers and technicians are responsible for it: music, abstract sounds, gunshots, rain and thunder, airplanes passing overhead, trains in the distance, telephones and doorbells ringing, sounds of nature (bird calls, crickets chirping), even military bands marching offstage, as Chekhov requires at the end of *The Three Sisters*.

Cue #	Page	Tape 1	Tape 2	Tape 3	Tape 4
1	61	Magic noise			Storm background
2	61		Thunder #1		
3	61			Thunder #2	
4	61	Wind blast			
5	61		Wave crash		
6	62			Thunder #3	
7	62	Thunder #4			
8	62		Ropes crash		
9	62			Bosun cry!	
10	62	Wave crash 2			
11	62		Thunder #5		
12	62	Wave crash 3		Big crash	
13	63		Thundar #6	Voices	
14	63	Split #1	Split #2		
15	63	Rocks crash	Wave #4		
16	63			Magic noise	
17	63	Distant storm	Rumble		
18	63			Waves	

Sound Cue Sheet for *The Tempest* A sound cue sheet listing sound-effects cues, locations on tape, and the page number of the script for a production of Shakespeare's *The Tempest*.

In consultation with the director, the sound designer plots the effects required by the script (and often added by the director). The new digital technology permits operators to program dozens of individually recorded sounds onto the control board, where each can be instantly recalled and played individually or in combination. Today, theatrical sound systems include speakers of high quality and versatility placed

SOUND DESIGNER
Jonathan Deans

Jonathan Deans is involved in the development of the use of digital sound-processing technology for mixing live (real-time) performances and automation (timed) performances. He has designed more than 120 musicals, plays, operas, Las Vegas spectaculars, and theme park attractions. Recent credits include *Ragtime, Fosse, Parade, King David, Candide, EFX,* and *Cirque du Soleil* at the Bellagio Hotel and *Mystère* at Treasure Island Hotel in Las Vegas.

Fosse on Broadway *Fosse*, a musical based on the choreography of Bob Fosse, with set and costume design by Santo Loquasto, lighting by Andrew Bridge, and sound by Jonathan Deans. The musical opened at the Broadhurst Theatre on West Forty-fourth Street, Broadway, in 1999.
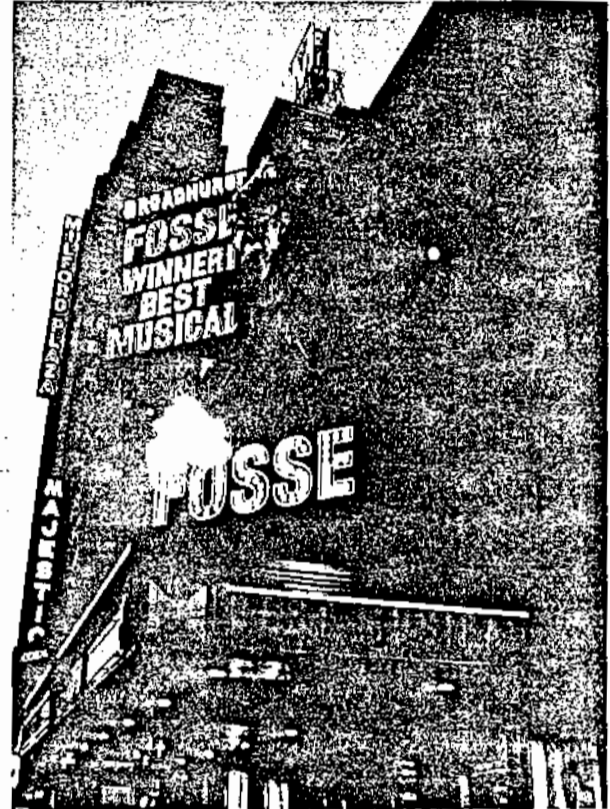
throughout the auditorium, a patch bay (a means of connecting tapes and microphones to any outlet), and a control board. Almost any sound can be programmed into a sampler with the exception of gunshots—which are still performed "live" with blanks because they are too loud for most sound systems. The use of guns on or off-stage must meet precise conditions specified by fire and safety authorities.

The Designer's Working Methods

Like the lighting designer, the sound designer studies the script, noting aural images and effects implied or detailed in the text (and the practicals, such as a telephone ring or a toilet flush); holds discussions with the director, other designers, the composer,

Laurie Anderson and Moby Dick

Laurie Anderson in a virtual voyage aboard Captain Ahab's ship *The Pequod* in *Songs and Stories from Moby Dick*, directed by Anne Bogart (1999, Next Wave Festival at the Brooklyn Academy of Music).

Performance artist Laurie Anderson created a virtual voyage called *Songs and Stories from Moby Dick* with a custom-built MIDI-controlled "talking stick," pre-recorded musical tracks (vocals and keyboards), in-ear monitoring system plugged into a wireless microphone system, loudspeakers, mixing console, and digital play-back devices. There are no literal whale sounds in the show. Anderson's sound track is basically an abstract landscape of sounds. The visuals, designed by Anderson herself, project images such as the opening of pages of a book, large gold coins, underwater bubbles, and various abstractions. At one point, Anderson, with short spiky hair, black clothes, and red shoes, sits in a huge arm-chair, a lone voice in a vast sea. Sound, images, and light-ing provide the audience with a road map into her inter-pretation of Herman Melville's famous novel.

and technicians; researches sound-effects libraries; records sounds and music; pre-pares a sound track; develops a cue sheet indicating the placement of each sound in the script, the equipment involved, sound levels, control levers, and timing of sounds; and determines placement of speakers and microphones. The sound designer also has assistants to help with preparations and crews to run the show.

Special Effects with Sound

Special sound effects capture the audience's attention for a theatrical moment and/or increase the emotional impact of a scene. A sound effect may be an offstage noise such as the sound of a car door shutting as preparation for an actor's entrance. Or it may be recorded music underscoring an emotional scene onstage. Whatever the sound effect, it grows out of a preconceived need on the part of playwrights, directors, and design-ers to enhance the storytelling.

Sound effects in the theatre date from the use of music and human voices to enhance the storytelling in the classical Greek theatre. Shakespeare wrote sound effects into his plays. They are mostly battle and storm sounds that could be re-created with percussion instruments and simple backstage devices such as thunder and wind machines. The English theatre during the Victorian era built other machines to reproduce the sounds of weather, horse-drawn carriages, trains, and disasters. These mechanical effects were handled by the property master rather than a sound engineer. In the modern theatre, such sounds as telephones ringing, gunshots, door slams, doorbells, and breaking dishes are still created manually backstage by a member of the crew. Less than thirty years ago, the introduction of electronic amplification followed by recording and playback systems, microphones and loudspeakers, and digital audio technology created the need for a "sound designer."

Abe Jacob introduced the sound designer into the American musical theatre, and now all Broadway, Off Broadway, and regional theatres hire sound designers and/or sound technicians to create this element of theatrical design.

COMPUTER-AIDED DESIGN: SCENERY, COSTUMES, LIGHTING, AND SOUND

For centuries, theatrical designers worked with the same tools as other visual artists: drafting table, paper, charcoal, pencils, colored paints, rulers, squares, and s!... ules. Not until personal computers became readily available did theatre artists .. .ch-nicians gain a remarkable new tool of far-reaching potential. In the mid-1980s, computer-aided design (CAD) and computer-aided manufacture (CAM) were widely adopted by the industry and became the fastest-growing technology for the stage.

This "machine" with its developing software has the capacity for configuring (and reconfiguring) spaces, angles, shapes, colors, perspectives, and measurements in response to the designer's imagination, research, and artistic choices. Computer-aided design is a remarkable asset in the design studio. First, computers reduce the drudgery of the set designer's drawing mechanics. With the click of a mouse, the designer reconfigures spaces, changes colors, lengthens lines, adds walls, raises platforms, inserts windows, reconfigures instruments on the lighting grid, and redesigns or resizes costumes. A click of the mouse also edits a text, adds director's notes, and inserts sound cues. Indeed, the computer saves many hours of painstaking drafting, copying, researching art collections, and creating final designs (and in color).

Vast visual and aural databases are literally at the designer's fingertips. Virtual libraries of art, sound effects, and music are found on CD-ROMs; and virtual catalogues of sculpture, decorative arts, chandeliers, and clothing and wardrobe collections from historical and modern periods have been digitized for computer retrieval. Re-use of another artist's theatrical designs can be subject to legal copyright considerations and always requires investigation.

Three-dimensional models of scenery can be created with computerized scenographic modeling. Even though this computer-enhanced technique has not replaced traditional ground plans and elevations, the computer models provide perspectives

from above and from the left, right, and center of the house. Although computing equipment for such modeling is expensive, it is often cheaper than rebuilding scenery when a director or designer decides at the last minute to move a door.

The use of computers holds out the promise of an "integrated computer design" whereby a design team can present at early conferences the scenic model, computerized costume renderings, colored lighting from calibrated lighting positions, and music and sound effects.

Computerized inventories of clothing, hats, wigs, shoes, and accessories have also revolutionized costume management and shops. For the costume designer, the advantage of the new tool is the freedom to cut, paste, and combine elements of clothing before actually purchasing and cutting the cloth. With the computer, a designer can change sleeves on a garment or shorten the skirt without sewing a single stitch. Through the use of the actor's photo and measurements, a "virtual actor" can be dressed in the entire costume design before fabric is cut and sewn. By the same token, the wig designer can "virtually" change color and styles before the first fitting with the actor.

In all cases, the reality of computers is instantaneous communications. Designs can be sent instantly across the United States by digital electronic transmission, reducing travel costs and conference time. However, as designer Jennifer Tipton warns, "Technology . . . is only as good as the person using it." The designer's creativity and imagination are not imperiled by the new technology, as some have argued. Greater experimentation and innovation are made possible by the ease and speed of computer-enhanced design.

TECHNICAL PRODUCTION

Without the *production team*—managers, technicians, craftspeople, and crews—no theatre has the capacity to organize the production; build and install scenery; create sound, light, and costumes for production; and run the show from start to finish. Depending upon the size of the theatre's organization, these individuals often outnumber the director, designers, and actors, and they shoulder responsibility for the production night after night.

The Production Team

Just as with any complex organization, the theatre has an established hierarchy of production managers and technicians charged with responsibility for supervising a large number of specialists: electricians, carpenters, stagehands, properties artisans, cutters, drapers, stitchers, milliners, wigmakers, shoemakers, wardrobe, dressers, makeup artists, light and sound operators, and running crews. A backstage hierarchy of management and technical practices—of what works and what does not—has evolved over centuries.

Until the twentieth century, technical crafts were learned through apprenticeships in the theatre. Today, the "technical arts," called technical production and costume

production, are taught ih college and university theatre departments, and students serve their "apprenticeships" within university theatre shops—the scene shop, the costume shop, the props shop, the sound and light studios. Each of these specialty shops serves as a working unit of the theatre as well as a laboratory for instruction. Key professional personnel command these shops and contribute through their expertise to the artistic enterprise as a whole—the production.

Production Manager

The technical production team is led by the *production manager* (PM) and seconded by the *technical director* (TD). The position of PM has grown in importance over the last two decades, especially in professional regional theatres.

The PM coordinates the staffing, scheduling, and budgeting of every element in the production, including building, installation ("load-in"), and operation ("running") of all design and technical elements. The PM is sensitive to the artistic needs of director, designers, and technicians throughout the production process and struggles with the complex problems of integrating the many disparate elements of production, including the needs of the theatre's shops. Safety procedures, accounting policies, legal codes and union practices, and time management are part of the PM's knowledge and expertise.
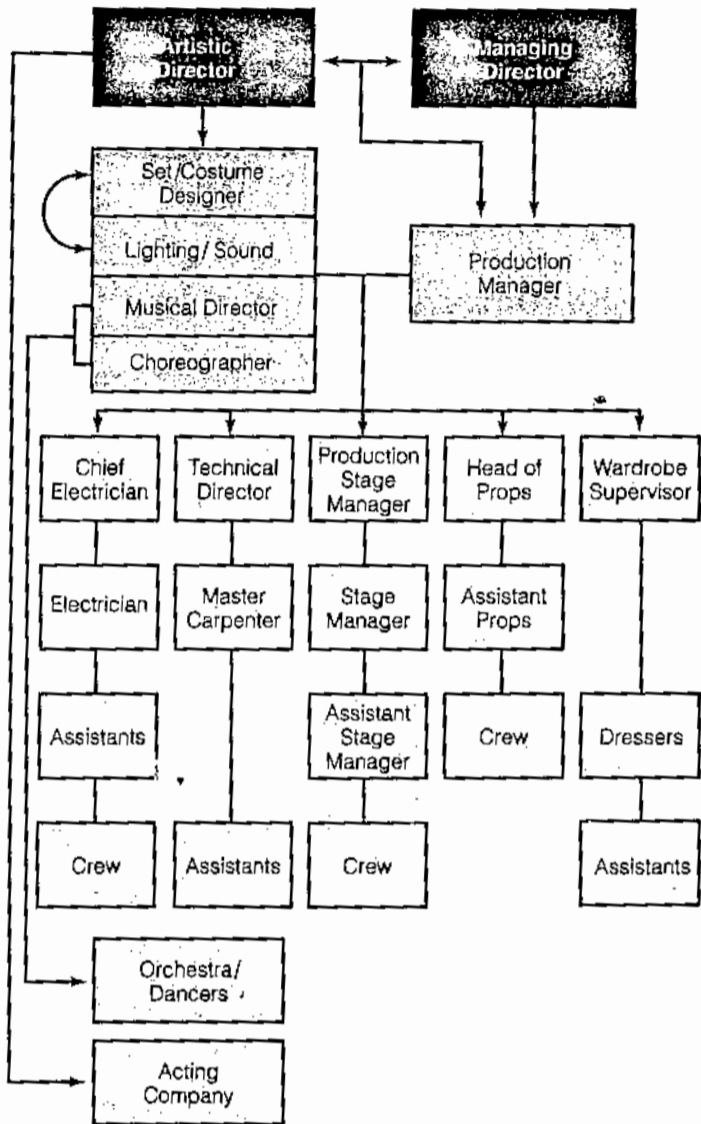
Technical Director

The TD has charge of the management of the scene shop and the construction and operation of scenery and stage machinery, such as hydraulics for moving scenery or trapdoors for special effects or entrances. Following the build period, which requires conferences with the set designer, the TD oversees the moving of scenery into the theatre, plans adequate "stage time" for the various scenery and paint crews to complete their jobs, and establishes policies and directives for scene shifting, special effects, and "strike" (the final removal of scenery from the theatre or into storage at the close of the production). The TD coordinates the build, the "put-in," and "strike" schedules in tandem with the other units of the theatre. In small theatres, lighting and sound installation and operation, for example, are often the responsibility of the TD as well.

International Alliance of Theatrical Stage Employees (IATSE) is the union that serves production managers, technical directors, and technicians in theatre, opera, film, and television, and employees in some sound studios. Sound designers are also represented by IATSE.

Costume Shop Manager

The *costume shop manager* has a function parallel to that of the TD, with responsibility for the management of the costume shop, its inventory and budgets; the buying of fabrics; and building, buying, and/or renting of costumes and accessories, including hats, wigs, and shoes. Following a comparable build period during which conferences are held with the costume designer and craftspeople, the shop manager is responsible for the scheduling of the tasks of the various personnel and crews in order to complete the costumes, maintain them during the run, and "strike" them according to the theatre's policies at the close of the show.

The Production Team in a Non-Profit Theatre

Production Team organizational chart: Artistic Director ↔ Managing Director. Under Artistic Director: Set/Costume Designer, Lighting/Sound, Musical Director, Choreographer. Managing Director → Production Manager. Below: Chief Electrician, Technical Director, Production Stage Manager, Head of Props, Wardrobe Supervisor. Chief Electrician → Electrician → Assistants → Crew; Technical Director → Master Carpenter → Assistants; Production Stage Manager → Stage Manager → Assistant Stage Manager → Crew; Head of Props → Assistant Props → Crew; Wardrobe Supervisor → Dressers → Assistants. Also Orchestra/Dancers and Acting Company.

Production Stage Manager

As we come to the role of the *production stage manager* (PSM)—formerly known as the *stage manager* (SM)—and the *assistant stage manager* (ASM), we find a highly responsible and artistically sensitive position. The PSM coordinates the director's work in rehearsals with the actors and the technical departments. For example, the use in rehearsals of furniture, props, and clothing will be coordinated by stage management. At the beginning of rehearsals, the PSM organizes and schedules calls and appointments, records the blocking of actors, anticipates technical concerns for quick cos-

Intercom systems and accessories provide instant backstage communication among key personnel.

tume changes and scenery shifts, and organizes and annotates the "calling" of the show—that is, the system by which actors' entrance cues, and lighting, sound, and scene-shift cues are initiated. During performance, the PSM has full responsibility for the running of the show and has final authority over the entire onstage and backstage operation. The ASM is usually positioned backstage during the performance with responsibility for the smooth operation of technical systems and the actors' exits, entrances, and costume changes.

The PSM also conducts understudy rehearsals and maintains the precision of the production in the director's absence during the run of a professional production. For example, if line rehearsals are needed, the cast is brought together and, while seated and without scripts, they say, or "run," their lines of dialogue with attention to accuracy. The PSM calls those rehearsals as well. Professional stage managers are members of Actors' Equity Association (AEA).

Technical Assistants and Running Crews

Just as designers have their assistants, key technical management people have assistants with such titles as assistant stage manager, assistant production manager, assistant technical director, assistant costume shop manager, and so on. These individuals are invaluable in the supervision of the many, varying elements within a production. In turn, they will be the next generation of stage managers, production managers, technical directors, and so on. The running crews, as their name implies, are the technicians and personnel who "run" the show from night to night.

TRANSITION ▶

All design elements in the theatre serve the play and enhance the storytelling quality of the theatre. In collaboration with the director, designers (in tandem with actors) transform the "empty space" into the living world of the production. The theatre's production and stage managers, along with the many technicians, provide the technical support system without which no theatre can open its doors.

THEATRE: A WAY OF SEEING ONLINE

Use the *Theatre: A Way of Seeing* website at http://communication.wadsworth.com/barranger6 for quick access to the electronic study resources that accompany this chapter, including links to the websites listed on the next page, InfoTrac College Edition, and a digital glossary. When you get to the *Theatre: A Way of Seeing* home page, click on "Student Book Companion Site" in the Resource box, pick a chapter from the pull-down menu at the top of the page, and then select an option from the Chapter Resources menu.

www Websites

The *Theatre: A Way of Seeing* website includes maintained links for all the websites described below. Simply select "Web links" from the Chapter Resources for Chapter 12, and click on the link that interests you. You'll be taken directly to the site described.

Arts, Crafts, and Theater Safety
A nonprofit organization concerned with artists' health and safety, including safety laws in the United States and Canada.

Glossary of Technical Theatre Terms
Searchable glossary of more than 1,500 theatre ter. s.

Lighting Links
A categorized index of some of the best (and most useful) lighting sites on the Internet today. These links include sites related to theatre, entertainment, and much more.

Professional Lighting and Sound Association (PLASA)
Information for lighting and sound professionals in the worldwide entertainment industry.

The Theatre Design and Technical Jobs Page
Source of a free list of job openings for all behind-the-scenes jobs in the live entertainment industry. Also includes a listing of freelance designers, directors, and technicians sorted by geographic area.

Theatre Sound Design Directory
Hundreds of links to sound design resources throughout the United States and worldwide.

United States Institute for Theatre Technology
The association of design, production, and technology professionals in the performing arts and entertainment industry.

InfoTrac College Edition

Available twenty-four hours a day, seven days a week, InfoTrac College Edition is an easy-to-use online database of reliable full-length articles from thousands of top academic journals and popular periodicals. You can use this valuable tool to learn more about the topics discussed in Chapter 12, as well as select and research topics for papers. Use the passcode that was included with your new copy of this text to access InfoTrac College Edition free for four months at http//www.infotrac-college .com. Then use the following search terms to assist you in exploring the topics introduced in this chapter:

computer-aided design, holographs, lighting design, lighting effects, lighting technology, scenic technology, sound design, sound effects, sound technology, technical production, theatre design history, theatre health and safety.