

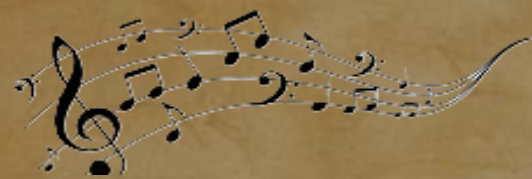
Production Technology
(ADM04004)

*Dave Roxbough
Meilir Evans
Dave Atkinson*

The background of the image is a decorative, aged parchment-like surface with a mottled tan and brown texture. It is framed by ornate, dark brown floral and vine patterns. Several realistic, detailed roses in shades of red and pink are scattered around the edges, with green leaves and thorns. In the center, the text is written in a white, elegant cursive script.

AI Statement:

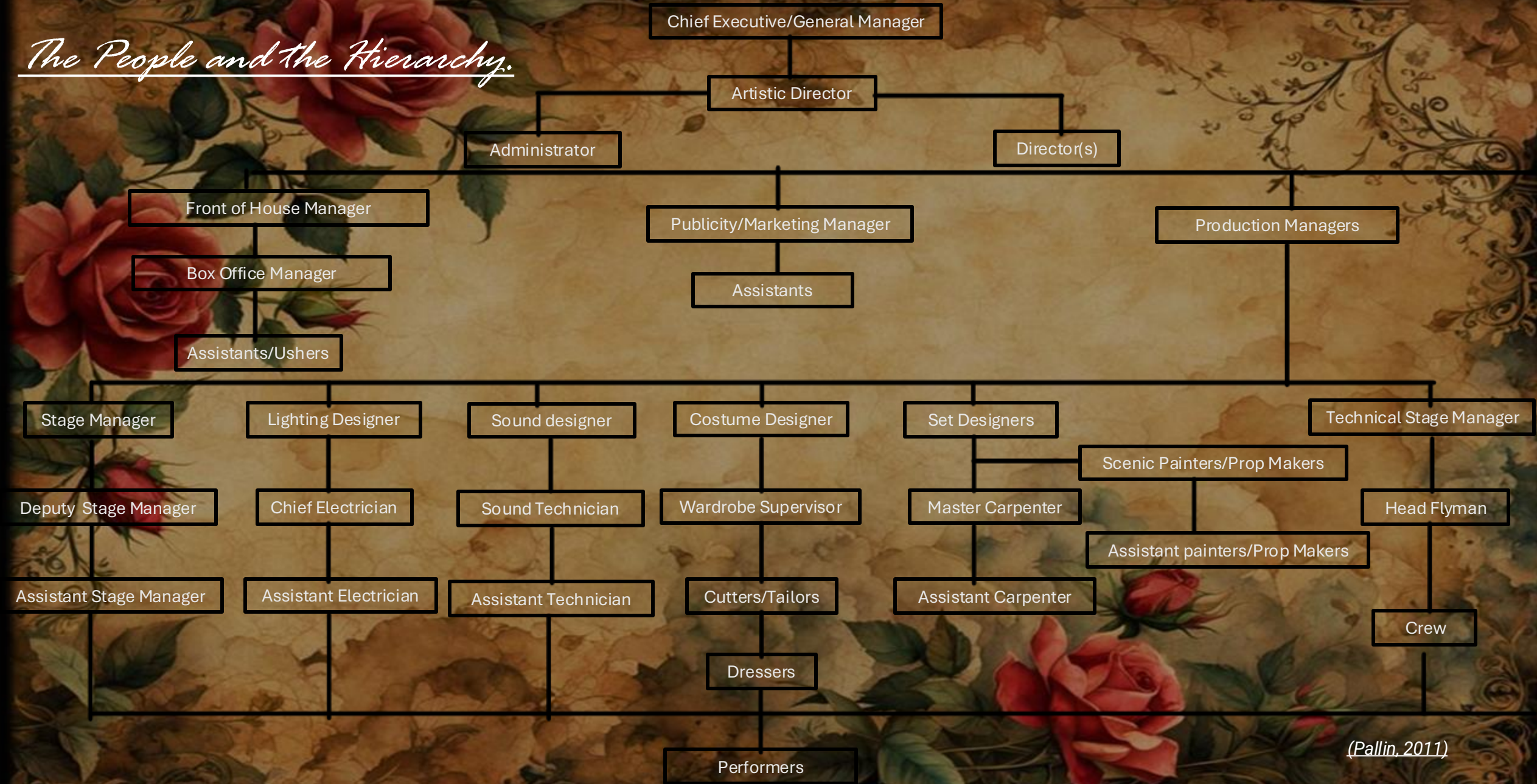
I confirm that I have not used any AI tools in the research and creation of this assignment. I confirm that I have not presented any AI generated materials as my own work. I confirm I have copies of my drafts, notes, and other resources I used, which I may be asked to provide in evidence.



Sound



The People and the Hierarchy.



(Pallin, 2011)

Higher up Roles

Chief Executive/General Manager

- Reports directly to the board of governors.
- Has responsibility for the general run time of the theatre.
- Liaises with the board and artistic director on artistic policies and strategy.
- Works with the Art. director and board to stay within yearly budget allocations.
- Oversees and staffs front of house and marketing departments.
- Liaises with the board of directors to negotiate contractual terms.

Production Managers

- Employs and supervises all production staff.
- Ensures staff are trained and familiar with the Health and Safety policy.
- Responsible for the maintenance and safety of all working areas and equipment as required under the Health and Safety policies.
- Liaises and agrees the budgets and design deadlines with the higher ups.
- Checks the set design itself for any safety worries.
- Oversees all ordering of materials and building work.
- Chairs design and production/progress meetings.
- Prepares the risk assessment.
- Schedules and oversees production week.
- Contributes to tech rehearsal.
- Attends first performance to confirm achievement.

Director(s)

- Has overall artistic control of the production they were hired for.
- Liaises with designers to create style and concepts.
- Responsible for advising all production departments.
- Maintains an overview of the piece to ensure a cohesive production.

Artistic Director

- Liaises with the general manager on artistic remit, planning and monetary allocations of the company.
- Hires directors and designers
- Plans the season with respect to all included/ relevant in the productions.
- Liaises with marketing in developing sponsorship and marketing policies.

Stage Manager (Company)

Is employed when a large production goes out on tour.

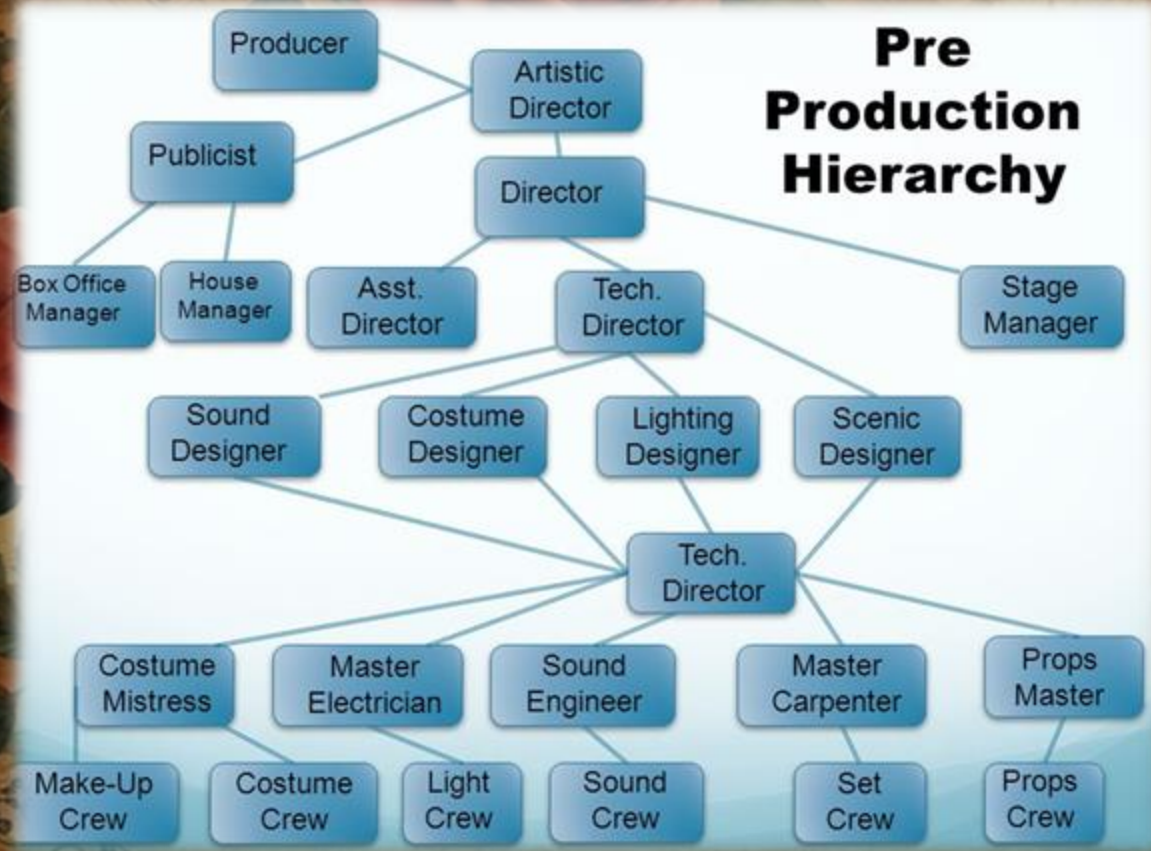
- Liaising with Marketing Dpt. And Front of House in each venue.
- Organising accommodation for cast and production team.
- Organising travel arrangements.
- Organising and monitors contractual arrangements of the company.
- Looks out for the health and wellbeing of the company
- Provides touring packs.
- Organising weekly payments.
- Monitors the weekly hours of the cast.
- Running extra rehearsals during the run.
- May facilitate and oversee the smooth running of stage management teams.
- May be responsible for weekly time sheets.
- Cover for stage managers on show calls.

Administrator

- Controls, administrates and keeps account of all spendings within the company.
- Responsible for employee's rights, pay and contracts.
- Originates and distributes allocated budgets to the managers.

Stage Manager

- Has overall responsibility for stage management team and training but should be prepared to do the work themselves if needed.
- Oversees auditions and provides and furnishes rehearsal space with a markup, rehearsal, props, furniture and elements of the set as per the director's discretion.
- Co-ordinates the info flow between all departments.
- Oversees the rehearsal process, company calls and overtime payments.
- Ensures rehearsals comply with Health and Safety policy
- Organises and participates in research, procurement and safe storage of props, furniture and set dressing and their safe return.
- Manages the stage management budget.
- Runs the technical rehearsal in liaison with the director, production manager and deputy stage manager.
- Responsible for health and wellbeing of the company and all aspects of the show during the run.



A different version of a Productions Hierarchy.

(This one mentions more depth into the separate crew responsibilities and the lower tiers and is also the one we were shown in class.)

Sound Tech Hierarchy

Sound Designer

Sound Operator
No.1

Sound Operator
No.2

Sound Operator
No.3

Crew

Desk Mixer

Monitor Mixer

Foley Artist

The Sound Designer

- ❖ Works closely with the director and a range of other staff to create the aural world of the show.
- ❖ May create sound effects, atmospheres, sonic textures and filmic ambiances that will create naturalistic and abstract worlds as well as the audience's emotional connection to the performance.
- ❖ May choose, edit and remix music, work with a composer to make original music or work with live musicians in the theatre.
- ❖ May advise on how best to hear the performers which might include acoustic adjustments to the theatre and set, or the addition and configuration of radio and/or float mics for the performers.
- ❖ Will design the sound system, bespoke to the specific production or auditorium that will give the audience the best experience of the show.

Must have a huge array of creative and technical skill set, including a well-developed sense of hearing, a comprehensive understanding of musical history and genre; a musician's sensitivity to balance, timbre, rhythm, melody, harmony and musical structure and a deep understanding of psychoacoustics, system engineering, acoustics, computer networking, component integration and of the systems for sophisticated audio distributions.

Sound Operator No. 1

- ❖ Positioned at the desk on the faders.
- ❖ Remains in the auditorium.
- ❖ Relays directions to No. 2 & 3.
- ❖ Will be the go-to for the designer.
- ❖ Will mix the *Levels*, *Eq* and *Levels* for the show.

Sound Operator No.2

- ❖ Usually, a mic or effects tech.
- ❖ Prepares, manages and maintains the mics as well as equipping the actors with their mics.
- ❖ Will be technical problem solvers.
- ❖ Preventative maintenance- means they check around the wires and tape them down, securing them.
- ❖ Liaises with the costume department to work the mics and belt packs into costumes and wigs.
- ❖ They label everything.

Desk Mixer

Some venues will have a mixer with a perfect ear for sound.
Often a musician.
Some bands will have their own mixer hired to tour with them. One who knows the equipment and the band's sound well. They can adjust the equipment on site to best suit the band. It will be very obvious if the mixer is absent or bad at their job.

Sound Operator No. 3

- ❖ A general assistant to those around.
- ❖ Will be a runner to assist number 2 and 1.
- ❖ Will bounce between FOH & BOH.
- ❖ Keeps themselves available and ready to help problem solve.
- ❖ Typically, the newest to the team.

Crew

(Sound crew/In-house staff)

- ❖ Workers employed by the venue or a local crew.
- ❖ Will know how things work in the venue.
- ❖ Everyone must check with them before unplugging or plugging equipment.

Monitor Mixer

- ❖ Will be shouted at a lot, needs to be able to take it.
- ❖ Very good at communicating.
- ❖ Needs a fast response to imbalanced sound.
- ❖ Should be level-headed- no ego.
- ❖ Will mix what band members/ performers hear in the monitors.
- ❖ A bad mix will hinder a bands performance and will be very obvious to the audience.

What is sound?

Sound is the movement of air in the form of waves of both high and low pressure. These radiate from a sound source at a speed of around 340m per second (760mph or 1260km/h). Sound travels faster in hotter and more humid air. As they travel further from their source, they gradually get smaller as the sound waves lose energy. The distance between the waves remains the same no matter how far they get from the source.

Amplitude- Volume. (diminishes)

Equidistant- Pitch of the note. (remains the same)

(Palmer, 2006)



(Julia, n.d.)

Shapes and colours



(Chaudhary, 2019)

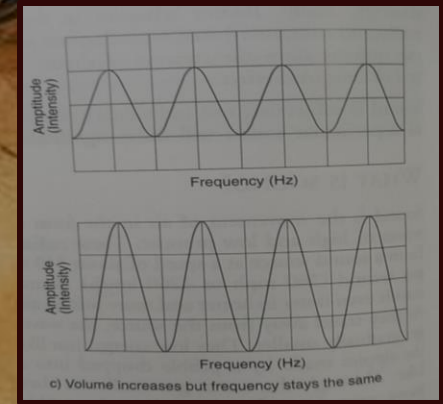
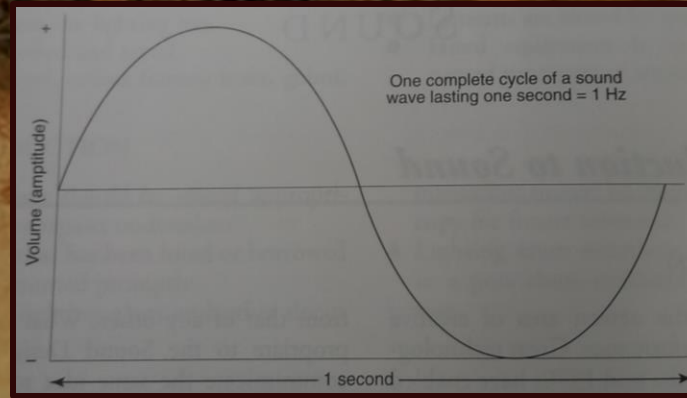
Sound radiates in ever-expanding 'spheres of waves'. The tiny differences in pressure associated with the waves are experienced as sound to the human ear. If the sound waves are regular, we hear a definable 'pitch', if they are random, we perceive this as 'noise'

(Palmer, 2006)

Frequencies:

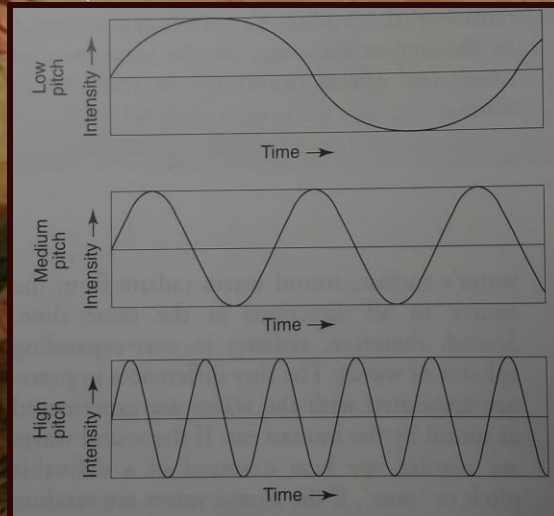
One wave, measured from a peak to another peak, (through a trough), is known as a **cycle of vibration**. The speed of the vibration determines the sound's frequency or wavelength. This is measured and expressed in cycles per second (cps) or Hertz (Hz), Named after Heinrich Rudolf Hertz (a German Engineer). A sound's frequency can be measured by an oscilloscope and displayed graphically. A single cycle which lasts for 1 second is known as 1 Hertz (1Hz). Higher pitched sounds will have a higher frequency than lower pitch sounds.

(Palmer, 2006)



Oscilloscope

Amplitude- Corresponds to the volume of a sound signal. It is the height of the wave from peak to trough. The greater the amplitude, the louder the sound. The characteristics of the way in which a sound volume varies are known as the **Dynamics**.



Hearing sound according to Scott Palmer.

The human ear can hear frequencies between 16 and 20000 Hz (20kHz). This range is known as the audio spectrum. This range will gradually deteriorate with age and sensitivity to higher frequencies is lost first.

Frequent/ Prolonged exposure to loud noise will cause irreparable damage to the ears.

Volume:

Depends on the amplitude, or intensity, of the sound wave.

Pitch:

This is related to frequency of the fundamental sound wave (the number of waves in a given time). The greater the frequency, the higher the pitch.

Tone:

The tone of a sound is more difficult to quantify, but the quality of sound depends on the number and kind of over-tones or harmonics.

Most sounds are more complex than previously mentioned and create several different sets of vibrations. Only the purest sounds (sine waves) which are generated electronically, do not have these multiple sets of vibrations. An audio test signal (sine wave) is an example of pure tone which is generated at 1 kHz. The first vibration of sound is known as the fundamental and subsequent vibrations are the harmonics which give depth to the sound. A musical note may have a fundamental of 100 Hz.

Its second harmonic will be 200 Hz, its third will be 300 Hz and so on. Each harmonic diminishes in intensity. The strength and quality of these successive harmonics determines the particular timbre/tone of the sound.

The precise nature of each subsequent harmonic wave will allow us to differentiate between two different violins playing the same musical note. Each instrument will generate slightly different frequencies and levels to create a distinct timbre.

(Palmer, 2006)

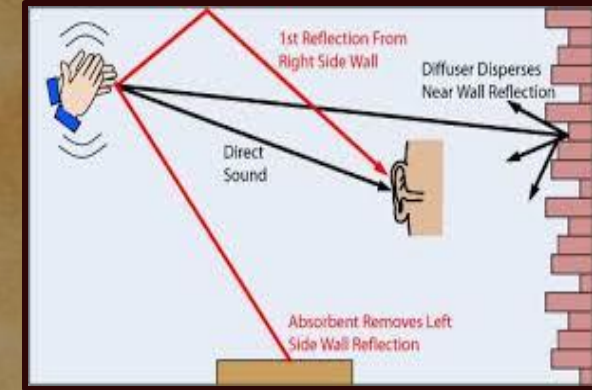
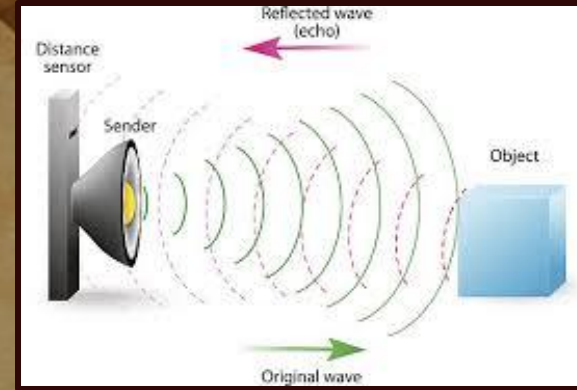
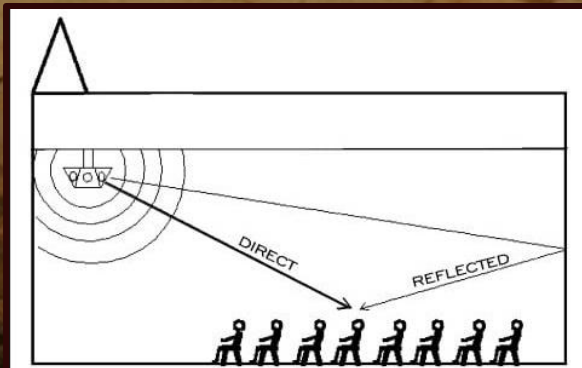
Reflection of Sound Waves:

It's well known when a light is shone on a mirror, the light-waves will be reflected back from the mirror's surface. Sound waves behave in a similar way. The difference being that light-waves are very small (visible light-waves vary between $0.76\text{-}0.39\mu\text{m}$) and will reflect from even the smallest objects. Sound-waves, especially low, frequency sound waves, are much bigger and therefore will only reflect from certain sized objects.

If a solid object such as a piece of scenery is placed in the path of a sound source i.e. loudspeaker, the size of the object will determine which frequencies are reflected from the object, and which will flow around the object. When sound-waves are reflected from an object, a sound 'shadow' is created in front of that object, causing a drop in our perception of the reflected frequencies. It's easy to see that the frequencies most likely to be reflected by a large, solid piece of scenery are the high frequencies, whilst the low frequency sound waves will be bent or diffracted around it.

Objects placed in the path of sound waves also absorb some of the wave's energy. Some materials absorb better than others. Soundproofing materials are especially designed to absorb as much sound as possible, whilst other materials are designed to absorb sound-waves of certain frequencies and can be used to alter the acoustic properties of a space. Thick cloth is very good at absorbing high-frequencies and presents a further problem for sound designers.

The way in which sound behaves is always and constantly governed by surroundings. Outdoors it will behave in accordance with the inverse square law (free field). (Leonard, 2016)



Sound waves from a source within an enclosed space bounce off the walls, floors and ceilings, these reflections combine with the original wave to a greater or lesser degree depending on where the listener is in the room. The closer to the source, the less apparent the reflected waves will be, the further away, the more apparent, until the combined effort of all the reflected sound waves obscures the original. The point at which the energy direct from the source equals the energy from the reflections is known as the critical distance, this distance will vary in accordance with the acoustics in the room. A point outside the critical distance is known as a reverberant field which is where the reflected sounds form a diffuse energy source. A room with many reflective surfaces is described as having a long reverberation time. Some reverberation is useful for adding character to speech and music and composers who write music for churches often use the reverberant characteristics to compliment the overall sound. A room with no reverberation is only useful for testing loudspeakers and microphones. Sometimes artificial reverberation is needed to enhance sound in space which are too absorbent.

(Leonard, 2016)

The Sound Booth:

A control booth, also known as a technical booth or control room, is a specialized enclosed space in a theater or performance venue dedicated to the operation of lighting, sound, and other technical elements during a production. Typically located at the rear of the auditorium or in an elevated position such as a balcony, it provides operators with an unobstructed view of the stage while remaining hidden from the audience. This setup allows lighting technicians, sound engineers, and sometimes the stage manager to monitor and adjust equipment in real-time without disrupting the performance. The booth is usually soundproofed to prevent internal communications or equipment noise from reaching the audience, and it features large viewing windows or one-way glass for visibility. Essential components include control consoles for lights and audio mixing desks, often connected to a show relay system that pipes the performance audio directly to the operators for accurate cueing. In modern theaters, control booths may also house video projection systems, automation controls for scenery, and digital networking for integrated show management, reflecting advancements in theatrical technology. Accessibility features, such as wheelchair lifts or ramps, are increasingly incorporated to comply with regulations like the Americans with Disabilities Act. While primarily associated with live performances, similar booths appear in broadcast studios and event spaces for comparable technical oversight.

(Groklopedia, 1970)

A control booth, in theatrical contexts, is an enclosed or semi-enclosed space designed to house operators, technical equipment, and control consoles for monitoring and managing stage lighting and sound systems, providing a dedicated environment separate from the stage and audience. In industrial settings, similar structures serve to protect personnel and instrumentation from environmental hazards like noise, extreme temperatures, or machinery operations, enabling oversight of processes such as loading or assembly. In theaters, it functions as a centralized hub where lighting and sound operators execute cues and adjustments to enhance performances without disrupting the audience or stage activities. The primary purposes include ensuring unobstructed visibility of the stage for accurate decision-making, isolating equipment to maintain operational integrity, and facilitating real-time communication among team members through intercoms or headsets. This setup allows for coordinated control, such as regulating light intensity and audio mixing for seamless scene transitions. In industrial applications, booths support monitoring of equipment like crushers or assembly lines from a secure vantage point, improving efficiency and safety. Control booths can be temporary or permanent installations; temporary versions are often prefabricated and portable for quick deployment in scenarios like events or construction sites, whereas permanent ones are custom-built and integrated into facilities.

(Groklopedia, 1970)



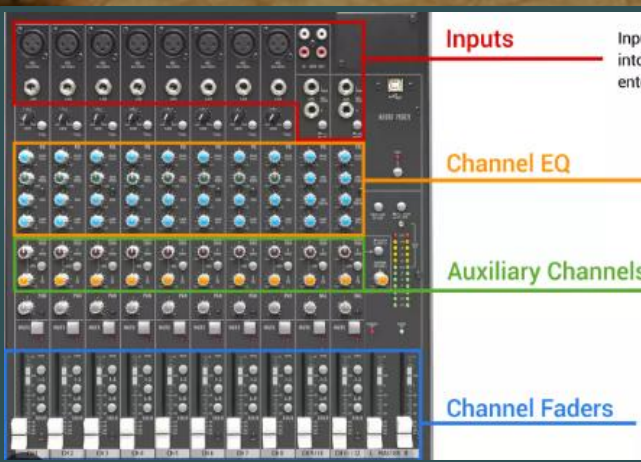
The Soundboard:

The soundboard, also known as the audio mixer or audio console, is the central hub of a theatre audio system, connecting all the different audio sources and output devices. As a sound engineer, you can think of it as your command center, where you have complete control over the audio signals and their routing.

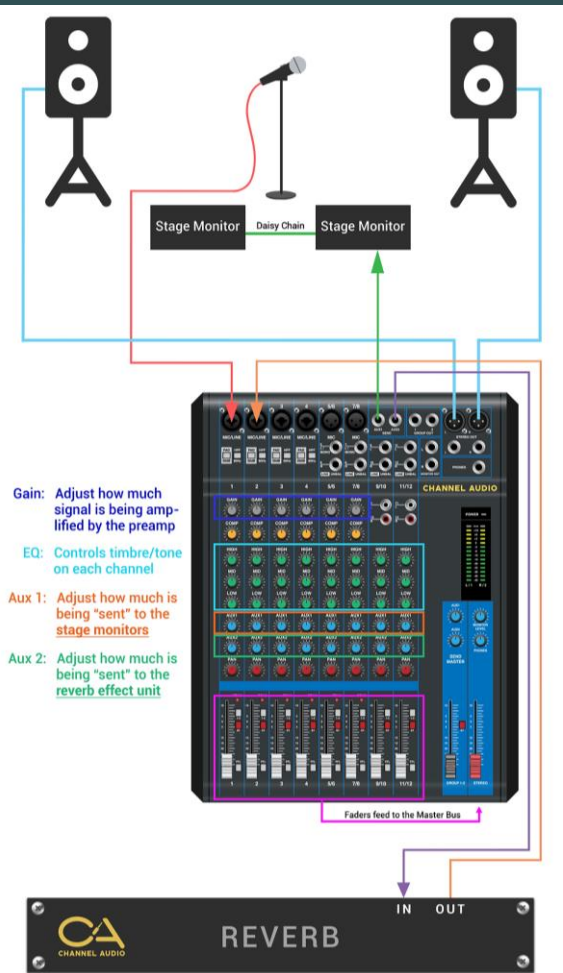
The soundboard consists of various channels, each representing a different audio source, such as microphones, musical instruments, and playback devices. The number of channels can vary depending on the complexity of the production, with some soundboards having as few as eight channels and others having upwards of 64.

Each channel on the soundboard has its own set of controls that allow you to adjust the volume level, equalization, and other parameters, such as dynamic range and delay. The soundboard also has a master fader, which controls the overall volume of the entire system. The audio signals from each channel on the soundboard are combined and sent to the output devices, such as the speakers or headphones, using a process called mixing. The sound engineer can use various mixing techniques, such as panning and spatial audio, to create a realistic and immersive sound experience for the audience.

(fdelano@hrenow.com, 2023)



<u>Soundboard Components</u>	
Input Channels:	The channels that connect the audio sources to the soundboard, each with its own set of controls.
Master Fader:	Controls the overall volume of the entire system.
Auxiliary Sends:	Additional outputs that allow you to send a copy of the audio signal to other devices, such as monitors or external effects processors.
Equalizers:	Controls that adjust the frequency response of specific channels or the overall sound system.
Dynamic Processors:	Controls that adjust the dynamic range of specific channels or the overall system, such as compressors or limiters.

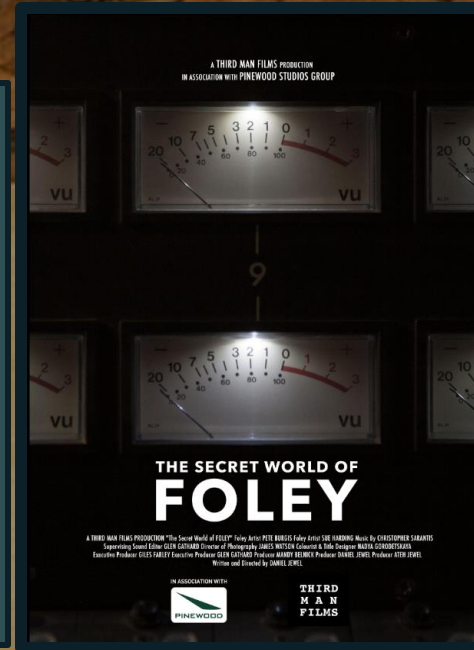


Foley Art:

"Foley is an integral part of the post-production world. It is the process of recreating every sound happening on the screen with recordings tailored to the production. These recordings are made by foley artists that perform alongside and in sync with the picture to create the sonic textures happening in every scene.

Typically, the original sound recorded during filming is focused on the dialogue. And is not very clear for spot effects, such as props being used or footsteps. That's where foley comes in. It's such an important process that there are studios dedicated to this specific craft. These are warehouses full of objects of all different shapes and sizes that mean more than what they were originally created for. It's all about the sound they make rather than the objects themselves. What they ignite in our mind when we hear them rattling, crushed or slammed against the floor. A pair of gloves can become the sound of bird wings flapping. Acorns and walnuts on a wooden surface can pass as breaking bones and something as simple as coconut shells cut in half make the perfect horse hoof noises. It's all smoke and mirrors to immerse the audience in the world that's being shown in front of them".

(Bricio, 2023)



'The Secret World of Foley', takes us on a journey into the little known world of Foley Artists, who bring films to life by adding sound effects in post-production. We follow a multi-award winning two-person team of Foley Artists and watch as they work together to bring to life a film about one morning in the life of a fishing village on the English coast. With their perfectly timed and precisely judged sound effects they transform the film as they interpret every sound detail, using props from their vast props store. This film shines a light on a little know film art form and is a testament to magic and wonder of Cinema itself. Directed by Glen Gathard.

(IMDb, 2026)

https://www.youtube.com/watch?v=wwkH_wQ6pC0

History of Foley art

Jack Foley, the man whom the craft was named from, was a sound editor who began performing footstep cues for his own reels and there is where this particular career began. He was a New Yorker of Irish descent, who grew up in Long Island. Foley art was created out of necessity at first, then expanded into an esteemed craft and then later enhanced and perfected by others to become a nuance and respected field of sound effects with its own name in honour of him.

According to Robert L. Mott, vaudeville, which was influenced by English music hall, was an important training ground for anyone interested in creating sound for radio(Mott was a generation behind Foley). In vaudeville, the drummer was responsible for highlighting gags and dramatic effects with the drum set. The drummer would typically take their cues from the actors. The audience became used to certain drum effects being used for a certain gag sound. When radio began to incorporate sounds into radio plays, the soundmen were sometimes these same drummers who had worked in vaudeville. This progressed into the use of records, gadgets and other props. As they had vaudeville, the drummers, now soundmen, also take cues from the actors. As radio drama progressed, the actors and soundmen would play off each other which resulted in more sound effects supporting the actors' actions.

(Vanessa Theme Ament, 2021)

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(Letterboxd.com, 2023)

Supporting vs Enhancing vs Replacing Reality in Foley:

Supporting Reality:

Some sounds, such as footsteps, must be performed with the intent of 'fitting in' with the dialogue previously recorded. This entails watching the sync very carefully and playing the recorded foley back with production on the stage to ensure that it does indeed enhance and not detract. This is also the case for most hand props that are performed. If the artist is handling a gun or flipping pages in a book, the performance should be realistic and subtle. The foley artist needs to duplicate (as closely as possible) whatever the actor is handling. Foley has been increasingly used to compliment edited sound effects. A car crash, for example, may be partially created from the sound captured in production, partially from edited effects a sound effects library, and partially from some field recordings that were ordered specifically for that scene. The foley may then be asked to add the personality and life of that particular car crash.

(Vanessa Theme Ament, 2021)

Replacing Reality:

When a show/film requires a newly imagined aural reality, the Foley needs to reflect that reality with the imagined characters. This occurs most often when a character isn't a real person, but is a monster, sci-fi character ect. that needs imaginary sonic life. Foley is an imperative at this point. When Foley takes on this responsibility, the artist needs to thoroughly understand the narrative in total. Nothing about this character is simple.

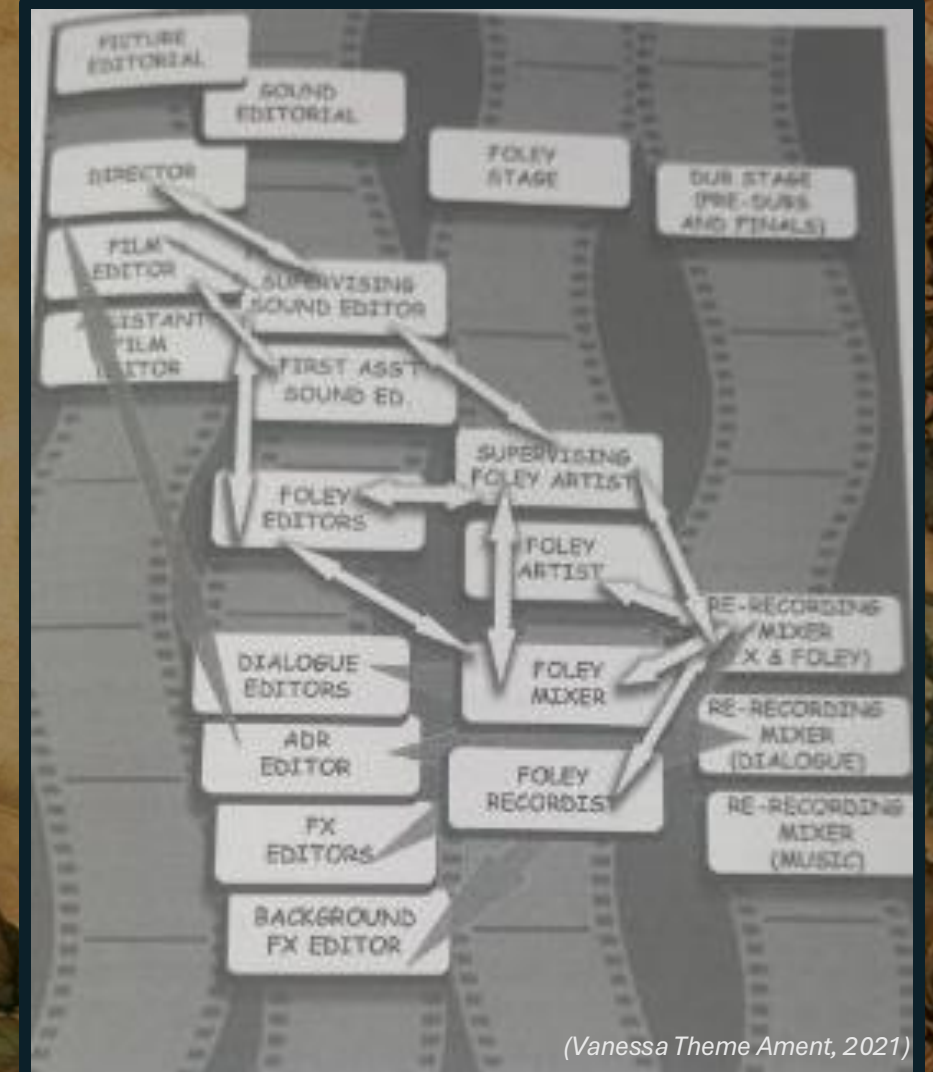
(Vanessa Theme Ament, 2021)

Foley Art:

Enhancing Reality:

Sometimes a supervisor has it in mind to have the Foley cover what is traditionally edited from library effects or customized field recordings. A typical event that is a married effect between Foley and sound effects is the ever-present body fall. Typically, the Foley artist will be down on the ground with some cloth or padding and will use the weight of the trunk of their body to thrust with control on the floor. This performance will be combined with whatever has been cut in effects, which is usually some heavy thump sound of one or two tracks. Body falls never sound how they would in real life. This is where enhancing reality is essential. When a body falls in film, it is for the purpose of creating a dramatic effect. The goal is to create a body fall that is hyperreal. It will sound bigger and louder than a real one, not so illogical that it takes the viewer out of the story.

(Vanessa Theme Ament, 2021)



(Vanessa Theme Ament, 2021)

ADR in Film



ADR, or Additional Dialogue Replacement, is a filmmaking technique with pros and cons, but any aspiring videographer would benefit from becoming proficient in the art. It's important to know when it's advantageous to use ADR to be mindful of moviemaking budget concerns and the quality of the final product. While the technique has other applications, such as video game technology and sometimes music, ADR is most common in the film and television industries.

Formerly known as "looping" and sometimes called "Automatic Dialogue Replacement," ADR is re-recording cinematic dialogue in a sound booth after a scene has already been filmed.

ADR is sometimes confused for "dubbing," which involves replacing one language's dialogue with another. Rather, ADR has the talent reenacting the spoken elements of the film. They watch the silent footage in the sound booth and replicate their own original tone, inflection, and affect in a controlled environment. The director usually sits with the actor as they re-record, allowing for quick dialog modifications and retakes.

(Orlando, 2022)

There are no truly controlled environments in which you can make a film. Even studio sets have ambient noise like the buzzing of cell phones and the clatter of a boom microphone. Movies filmed on location have even more noise to deal with, like traffic, crowds, and overhead airplanes. Sometimes directors decide in post-production to change the dialogue in its entirety for artful purposes. Either they don't like the vocal effect that came out of the filming, or they literally decide to change the verbiage, perhaps adding a line or accommodating an actor's perfect improvisation. All this is possible using ADR.

While sound editors are magical people and have some serious tricks up their sleeves when it comes to intrusive noise, sometimes a director just has to re-record dialogue – especially when the scene is otherwise perfect and cannot be re-shot. At the beginning of a session, the sound mixer cues the video up to a frame where the actors can prepare to get back into the role. The sound mixer records – and re-records – the actor's voiceover.

After you record the new dialogue, you must integrate it with the video in post-production. Sound editors generally use Avid software's Pro Tools to begin a project. Adobe Premiere also has a simple-to-use ADR feature for those with a lower budget.

There is a difference between ADR for live-action films versus animated films. When actors do voiceover work for animation, they perform the initial takes in a sound studio with a perfect microphone and acoustics. Replacing errors or recapturing their dialogue for whatever reason is simpler, as the raw piece is already so crisp.

(Orlando, 2022)



Glen Gathard

Glen Gathard heads up creative audio operations for Pinewood, and he is an award-winning Sound Editor, Foley Mixer and Sound Designer. He was head of the sound department for around 375 movies, games, series ect. And for 9 up incoming.

How did I come across him?

He was the dialogue editor for the second Spiderman video game; one I used to play with my younger sister. And he was the foley mixer for Netflix's film 'Nimona' which I watched with her for our movie night.

After researching a little more into him I found a full list of his work. He worked on several movies my father did- just a fun fact. Gathard also produced a short film called: 'The Secret World of Foley'



For Gathard and his team of three foley mixers, five foley editors and additional foley artists, its about working in an open room at Pinewood kitted out with a variety of different microphones and recording the sound of everything that makes a noise on-screen. From the sound of booted feet on gravel to a door swinging and closing is recorded by them in the studio.

"We work in a big open room. We all have the details of the characters and who they are and everything the characters interact with that generates sound, and we break that down into manageable element"- Gathard.

The team works closely with the sound supervisor on each project, who will check in on the progress to ensure everything is in line with the director's overall vision for the film. They have a 'spotting' session with the entire team to organize all the departments, and everyone is briefed. The Pinewood team uses eight different mics in a single foley session. This helps vary the acoustics and shift recordings between direct and ambient. It takes a minimum of ten days to complete all the foley work on a single project but can vary and differ depending on budgetary constraints.

"We use everything and anything," Gathard tells KFTV of the wealth of props he and his team use to generate the sounds needed. "It ranges from 20 different guns through to a Hungarian carriage, different punch-bags and endless collections of cups and crockery."

(Goundry, 2017)



Microphones

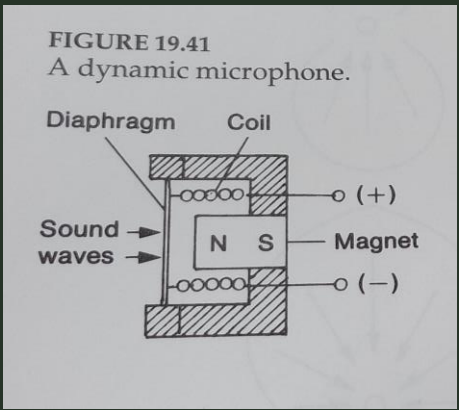
Microphones covert mechanical sound waves into an electrical signal. There are five basic microphone types; Dynamic, Carbon, Crystal, Ribbon and Condenser.

❖ Dynamic mics are the most commonly used-model due to their affordability and robust construction. Essentially, a type of microphone that uses electromagnetic induction to convert sound waves into an electrical signal. They are renowned for their ruggedness and ability to handle high sound pressure levels (SPL), making them a staple in live sound environments and recording studios. In this case 'Dynamic' refers to how sound transfers in volume and is proficient in capturing loud aggressive sound while picking up less background noise.

"Technically speaking, dynamic microphones operate using the simple principle of electromagnetic induction. Inside the microphone, a diaphragm is attached to a coil of wire and placed within the magnetic field of a permanent magnet. When sound waves hit the diaphragm, it moves, causing the coil to oscillate within the magnetic field, generating an electrical current that mirrors the sound waves. This signal can then be amplified, through a PA system or otherwise, or recorded into an audio interface for editing and production in your DAW.

The lack of an external power source, such as phantom power, makes dynamic mics particularly appealing for environments where simplicity and reliability are key, while their sturdy construction also means they can withstand physical abuse and high sound pressure levels, like drum kits or guitar amplifiers, without distortion."

(April 2021, n.d.)

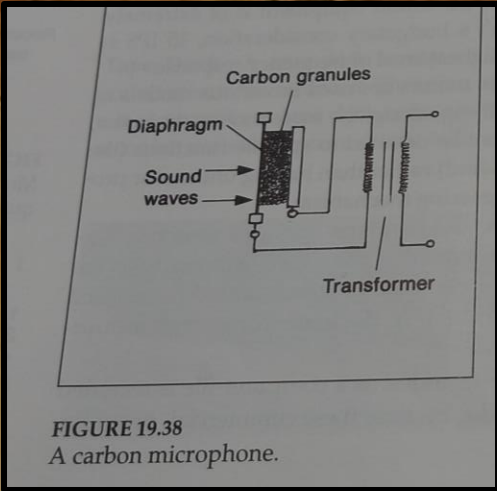


(Michael, 2012)

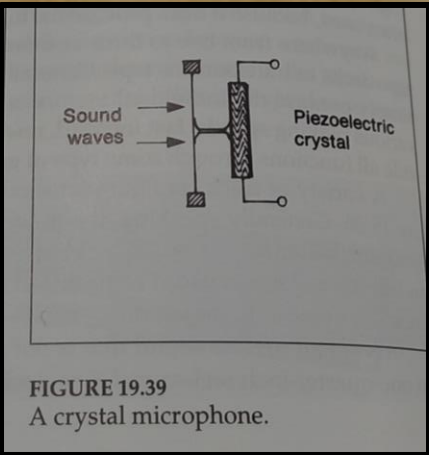
❖ Carbon Mics. A microphone element that consists of two metal plates separated by granules of carbon. When one plate (the diaphragm) is vibrating, the carbon's resistance varies, modulating an electric current through the element. Earlier they were widely used for the mouthpiece in telephones.

(Dpamicrophones.com, 2026)

It is extremely rugged and has a very narrow frequency response. These mics aren't really suitable for recording theatre sound unless you wish to replicate the sound of someone speaking through a phone. (Michael, 2012)



(Michael, 2012)

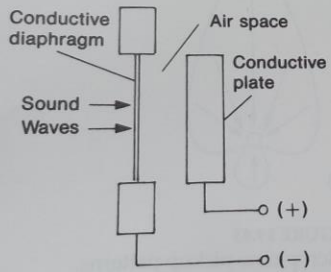


(Michael, 2012)

❖ Crystal Mic. the construction involves a finger-shaped crystal slice, a compliant clamp secures it at one end and the apex of a cone braced against the other end. The cone presses against the crystal bending and releasing it alternatively, this is caused by sound pressure waves. A pair of contacts is used to remove the signal when fixed on opposite surfaces. Signal can improve if the crystal slice is replaced with two of them cemented together. When pressure is applied one slice is compressed while the other is stretched, producing equal and opposite voltage which gives double the output. The double- crystal unit is called a bi-morph. Unfortunately, the frequency response is restricted by the mass, which must be moved by the sound pressure acting on the cone and the transient response is limited. A long cable will reduce the high output voltage from a crystal microphone and may affect its high-frequency response. (www.soundbridge.io, n.d.)

To Be Continued.....

FIGURE 19.42
A condenser microphone.



(Michael, 2012)

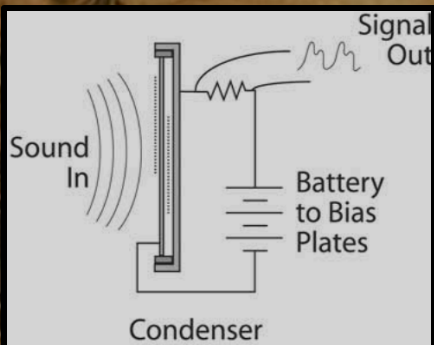
❖ Condenser Mic, more sensitive than their dynamic siblings, and due to their design, are better at picking up more detail in a recording, with lower self-noise and better accuracy across a wider frequency spectrum. This does unfortunately mean it is more sensitive to background noise, therefore isn't suitable for loud places or spaces with reflective surfaces. Best used within studio recordings, a controlled space. (RØDE Microphone, 2022)

This is the most electrically complex type of microphone. The diaphragm, constructed of thin conductive material, forms one plate of a condenser/capacitor. The other plate is placed very close. A constant voltage is applied to them. When a sound wave strikes the diaphragm, the pressure changes the gap between the two plates. This causes a capacitance of the condenser, which results in a change in the voltage applied between the plates. The resultant variations in the voltage are an electrical reproduction of the mechanical pressure changes originated by the source of sound.

Used for recording in the theatre. It is probably the highest quality, has excellent frequency response and dynamic range. It does require a power supply.

(Michael, 2012)

Different style of diagram but carries the same points. I just found it easier to follow.

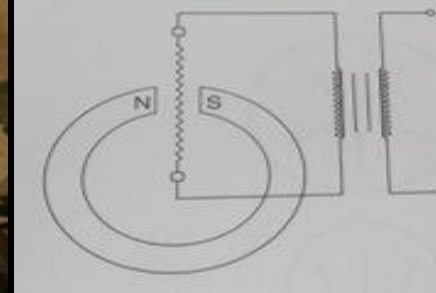


❖ Ribbon Mic, These are created from a corrugated strip of extremely thin metal that is suspended between the poles of a magnet. When someone speaks, the sound waves strike the metal ribbon, swaying it back and forth within the magnetic field. This movement induces a small voltage between the two ribbon ends. The pattern of this varying voltage is an electrical duplication of mechanical pressure changes that changes created by the voice in the mic. The microphone has a very good frequency response but it's quite fragile and delicate. Blowing on into the mic can damage the ribbon. They can be used for radio broadcasting. They are a little too fragile to use for theatre as those mics generally get a little battered. (Michael, 2012)

Ribbon mics are fundamentally 8 figured, They pick up sound from the front and the back but not the sides. They reject the side noises really well. It has more power to ignore sides and ceiling noise than other types of mics. They have very weak output and need a lot of gain from the preamp. (www.soundonsound.com, n.d.)

(Michael, 2012)

FIGURE 19.40
A ribbon microphone.



Dynamic Mics

Shure SM57

The off-axis noise rejection qualities make it a standout for many recording scenarios, and it's a must-have in the mic locker of any serious engineer. The build quality of the SM57 is also legendary, and it will handle being thrown around in both live and studio scenarios. The 'Best Budget Mic'. (April 2021, n.d.)



Variable-D- A unique design of a cardioid microphone implementing Variable Distance to the diaphragm's rear. It applies three different paths for LF, MF, and HF. The result is more constant output independent of distance to the source and thus more negligible proximity effect. Wiggins described the principle in 1954, and the design has been implemented and registered by Electro-Voice.

Audix i5

Widely used for miking up snare drums, guitar cabinets, and brass instruments. The i5 delivers a clear and well-rounded sound with a smooth frequency response, handling high sound pressure levels without distortion.

Its rugged design makes it suitable for live performances and studio recordings alike. With its excellent off-axis rejection, it's also great for isolating instruments in noisy environments, providing a tight, focused sound.

(Fellows, Grimshaw and McCracken, 2022)



Shure SM58

Renowned for its excellent noise-rejection qualities and coming with a built-in pop filter to help reduce those plosives and pops. The key to its performance is the ball-shaped grille, which prevents your vocalist from getting too close to the capsule and overloading it. An internal shock mount makes it perfect for vocalists who want to take it off the stand and run around the stage with it. (Fellows, Grimshaw and McCracken, 2022)



Electro-Voice RE20

Many broadcasters like to close-mic because the resulting proximity effect gives their voice a warm richness. Unfortunately, they like to move around so often the voice comes out thin and whiny. The RE20 is a professional level dynamic mic with a surprise trick called Variable-D. On the rear of the mic's diaphragm is a perforated pipe that ensures a consistent frequency response whether the source is on-axis or up to 180° off-axis. This allows the vocalist the freedom to move about (deliberate or not) without influencing the sound. The Variable-D mics produce a tight low-end that's perfect for capturing kick drums, guitar cabs and other low frequency instruments.

(Fellows, Grimshaw and McCracken, 2022)



Sennheiser MD 421.

Began as a broadcast mic but has since become a studio and stage favourite for close-miking snares, bass drums and toms. In fact, such is its popularity that you'll regularly find it sat in front of guitar cabs, bass cabs and podcasters, too.

This is a rugged, well-built, professional piece of kit. Its tight cardioid pattern does an excellent job of rejecting feedback and sounds outside of your source. Handling noise is also successfully suppressed. 'BEST FOR VERSATILITY' (Fellows, Grimshaw and McCracken, 2022)

Shure SM7dB

An updated version of the mic that Michael Jackson famously used for his Thriller performance. It is a close-proximity studio, it delivers a warm, midrange rich sound. It is more expensive than others but 'holds its own in the studio against more expensive condenser mics that cost 10 times as much'.

On standard settings the mic has a relatively flat frequency response from about 100Hz to 12kHz, ramping up smoothly from the bass end but falling dramatically from the high end. This can be fixed with a few switches flicked at the back of the mic.

The mics design incorporates an integral shock mount, pop filter and electromagnetic shielding to reduce hum from computer equipment nearby. It is also very effective for excluding noise and reflections. (Fellows, Grimshaw and McCracken, 2022)



Dynamic Mics



AKG D12 VR

This mic is to be plugged into an interface or mixing desk and it behaves how a good dynamic drum mic should. Its responsive diaphragm captures a very detailed sonic picture, while its optimised bass chamber does an amazing job of handling low frequencies. It will greatly improve the sound if some phantom power is added. There are three active filters at your disposal to sculpt, shape and fettle. The dial in the middle filter (red light) to remove some of the midrange frequencies to leave space for other instruments in the mix. This setting stops the kick from sounding too 'thumpy'. Flicking the filter switch on the (green light) will add a bass boost to the midrange scoop, giving off a wider sound with a more saturated kick.

Switching it to the right (blue light) will bring in some high-end boost, giving the sound more presence, depth and an airiness to the kick. This mic is a fantastic drum mic in passive mode, but messing with the filters and it will greatly improve. (Fellows, Grimshaw and McCracken, 2022)

Sennheiser e 609 Silver

The e 609 Silver is a guitar cab mic that delivers a natural, transparent, assertive sound. This mic is liked for its simple set up. This mic does away with mic stands. Just a cable is needed to be thrown over the top of the cab and dangle the mic from it, making sure the face of the mic sits nicely against the grille cloth. Adjusting the mic so it directly hangs over the speaker and off you go. It can be stabilised with some duct tape. The mics build quality is excellent. Sennheiser has christened the e 609 Silver the 'rugged workhorse with a practical shape'. The mic compensates for humming and is constructed so as not to rattle or vibrate, even when capturing very loud volumes. (Fellows, Grimshaw and McCracken, 2022)



Grille - A microphone grille (or "grill") is the protective mesh-like layer around a microphone's capsule. Grilles provide varying degrees of protection from physical trauma, plosive gusts of air, and moisture while still allowing sound to enter the mic capsule effectively. (Arthur, n.d.)



Audio-Technica ATM230PK

These mics have a slightly freaky looking frequency response. There is a lift in the midrange, another in the higher frequencies, but there is then a fast tail off from around 10kHz upwards. The polar pattern is quite focused and rear rejection is decent. This means cymbal bleed is minimal. Close-milking these mics sound great. Milked just above the rim, toms sound punchy with a nice attack, and the proximity effect delivers plenty of round bottom end without excess boominess. They're not designed for snare.

(Fellows, Grimshaw and McCracken, 2022)

Cymbal Bleed- Put simply, cymbal bleed is any unwanted "leakage" of the hi-hat or other cymbals being picked up by the close mics of the snare drum and toms.

For example, you'll know if you have cymbal bleed in your snare drum if you are able to solo your snare drum microphone and still hear your hi-hat clear as day.

Because cymbals are obnoxiously loud, it's nearly impossible to have a drum recording without at least some cymbal bleed to deal with. However, there are techniques you can use that we'll discuss to reduce the amount of bleed you have to fight against.

Ironically, cymbal bleed isn't always bad and can sometimes add that extra atmosphere into your drum recordings.

(Aixdsp.com, 2024)

Heil Sound PR 40

This is another high-performance dynamic microphone, highly praised for its broad frequency response and clarity. The PR40 has a rich low-end and smooth high-end, which is suitable for voiceovers, podcasts and capturing bass-heavy instruments.

Its unique internal design offers superior isolation and minimises background noise which makes it a popular choice for professional studios. This mic stands out for delivering condenser like details whilst maintaining the ruggedness and reliability of a dynamic microphone.

(Fellows, Grimshaw and McCracken, 2022)



Condenser Microphones:

Dynamic Vs Condenser

Dynamic Microphones:

Rugged, no external power needed, great for high-SPL sources like drums and guitar amps

Condenser Microphones:

Extremely sensitive, require power, capture intricate details, perfect for vocals, acoustic instruments, and studio recording

(Vintage King Blog, 2025)

Selecting the right condenser microphone is a nuanced process that goes beyond simple specifications. Your primary consideration should be your specific recording applications, which will guide your choice more effectively than any generic recommendation. Budget also plays a crucial role, as condenser microphones range from affordable project studio options to high-end professional models.

Consider your existing microphone collection to ensure you're adding something that complements rather than duplicates your current setup. The desired sonic characteristics are equally important—some microphones impart a specific color or warmth to the sound, while others aim for absolute transparency.

Lastly, don't overlook your room acoustics, as even the best microphone can struggle in a poorly treated environment. Remember, there are no absolute "wrong" choices—only microphones that are more or less suited to your specific needs.

(Vintage King Blog, 2025)

WA-CX12

Tube Condenser Microphone:



The WA-CX12 is a faithful recreation of the most natural and balanced tube mic of all time. The WA-CX12 cuts no corners in achieving a highly accurate sound profile of the original, known for its organic tones and elevated room sounds. Some of the most notable artists to create music with the original include The Beatles, Lupe Fiasco, Tom Petty, Michael Jackson, Alanis Morissette, and Taylor Swift, ect.

The WA-CX12 sound profile is known for capturing the real sound of a performance. Designed to provide clarity in the midrange and smooth out any high-end harshness, the WA-CX12 delivers professional solo vocals, intricate piano performances, and epic, natural room sounds. Like the original, the WA-CX12 tone is mostly flat until a slight dip at 2kHz with a gradual boost between 5-10kHz.

(Warm Audio, 2026)

WA-8000g

Large-Diaphragm Tube Condenser Microphone:

The WA-8000 is a true reproduction of a 90s modern classic known as the go-to mic for rap, hip-hop, R&B and pop. The original design has delivered platinum recordings for artists like; Snoop Dog, Eminem, Rihanna and more.

Just like the og, the WA-8000 boasts a natural and open top end, supremely clear midrange, and the ability to render detail beyond most mics. Works well with vocals, drums, acoustic guitars and more, the WA will 'rise to the challenge' and delivers with signal clarity, within the beats.

(Warm Audio, 2025)



WA-47T Titanium

Large-Diaphragm Tube Condenser Microphone:

The WA-47 is an authentic reproduction of the most coveted tube condenser microphone, hailed for its timeless studio sound. The WA-47 accurately matches the sonic profile of the prized vintage originals delivering the deep bass, rich midrange, and smooth highs that made it favorited by legendary recording artists like Frank Sinatra, Johnny Cash, Ella Fitzgerald, Billie Holiday, Elton John, ect.

The WA-47 is designed and built to deliver the most authentic vintage 47-style sound with zero corners cut. Just like the original, the WA-47 circuit allows a lot of low-end and mid detail to come through. While the lows and mids come together to capture all the rich warmth and detail of acoustic instruments, vocals benefit greatly from the smooth and pleasing top end of the WA-47. The coveted and unmistakably vintage sound profile of the WA-47 makes it the perfect choice to create timeless music.

(Warm Audio, 2024)



Condenser Microphones:

Wa-14sp

Stereo Pair Large-Diaphragm Transformer-Balanced Condenser Microphone:

The WA-14 is an authentic recreation of the ultra-rare “EB-circuit” 414-style microphone, the most truthful studio mic of all time. Ideal for capturing the natural sound of performances, the WA-14 delivers the same sonic performance of the original - a favorite of artists like The Police, Common, Freddie Mercury, and Billy Corgan.

The WA-14 achieves the same sonic performance of its original “EB” inspiration, delivering clear midranges, controlled bass, and accurate high-end emphasis for recordings that stay true to the original performance. For this reason, the WA-14 and the vintage original are celebrated as the ultimate “jack of all trades” mic.

(Warm Audio, 2026)



WA-CX24

Large-Diaphragm Stereo Tube Condenser Microphone:

The WA-CX24 is a faithful recreation of the most iconic stereo tube condenser mic ever made. Designed to capture the rich, three-dimensional sound behind countless classic recordings, it delivers the same wide stereo image and natural warmth that made the original a studio staple. With dual large-diaphragm capsules and true tube circuitry, the WA-CX24 reproduces the smooth detail that made it a favorite on orchestras, pianos, and drum overheads. Famous for sessions with artists and engineers like Elvis Costello and Steve Albini, the original’s sound profile & iconic multi-pattern stereo functionality is accurately preserved with the WA-CX24.

In addition to the original sound profile, WA-CX24 recreates the critical dual 180-degree rotating capsules for exceptional flexibility to achieve precise stereo imaging in audio recordings. Independently adjusting the position of each capsule allows for error-proof stereo pickup patterns for various recording techniques, such as XY, Blumlein, mid-side, or a custom angle tailored to the sound source and recording environment. Built around dual all-brass CK12-style capsules & two TAB Funkenwerk (AMI) US-made output transformers, the WA-CX24 delivers professional stereo recordings with phase-coherent vocals, intricate piano performances, and epic stereo room sounds.

Ribbon Microphones:

There are several characteristics that are proprietary to ribbon mics vs. dynamic or condenser mics, too.

To start, ribbon mics have a distinct warm, dark and “vintage” tone that is desired for certain types of recordings and are known for their accuracy. Most ribbon mics also feature a bipolar pickup pattern (also known as a “figure 8” pattern).

On the downside, they are also known to be extremely fragile, and for the traditional models, using phantom power with them or exposing them to extremely high SPLs (sound pressure levels) can result in disaster, so you’ll want to be very aware of your setup and may want to consider using them mainly for controlled studio work vs. the rigors and uncertainties of the road.

Ribbon mics are also on the expensive side, so some folks consider them a “step-up” mic rather than a first purchase.

(reverb.com, 2026)

T-Bone RM700

This is the T-Bone version of the Alctron HRM-15 that also shows up as the TNC Audio ACM-2 and Nady RSM-4. SPL handling is the same as the RB100, but frequency response is given as 20Hz–10kHz. A shockmount is included and it ships in a wood box. It’s reported that the RM700’s ribbon motor is mounted towards the front of the mic. This off-centre design produces different sounds from the front and back, with extra brightness at the back. The downside is that using the RM700 as the ‘side’ mic of a mid-and-side arrangement is not ideal. Ribbons with this motor have an upper-midrange resonance peak just before the roll-off frequency. Consequently, they’re well suited for electric guitar.

(MusicTech, 2014)



Ribbon Microphones:

Alctron HRM-15

The HRM-15 is a lollipop-style ribbon microphone, with a 35x5mm, 2.5-micron aluminum ribbon in a symmetrical position. This yields an even bidirectional response, ideal for the ‘S’ channel in Mid-Side recordings.

Like all Alctron mics, the HRM-15 is rarely seen on the market, although its various “rebadged” equivalents are commonplace. See the Nady RSM-4 and Cascade Fathead.

The mic ships in a padded wooden box with a shockmount. The Ningbo Alctron Electronics Co., Ltd. HRM-15 is also known as: RM-15, HRM15.

The mic was released in 2005.

(Recordinghacks.com, 2025)



WA-44

STUDIO RIBBON MICROPHONE

The WA-44 faithfully recreates the most iconic studio ribbon microphone of all time. Just like the legendary RCA 44BX ribbons of the 1930s loved by crooners, band leaders, drummers, upright bassists, producers and more, the WA-44 delivers powerful bass with a pronounced proximity effect, lush mids, and a tamed top end. The WA-44 excels on loud audio source and delivers the iconic warm, vintage, & sultry tones, which is what made the original the mic of choice for some of the most legendary vocalists including Elvis Presley, Ella Fitzgerald, Jeff Tweedy, Frank Sinatra, Johnny Cash and many more.

With a boutique-quality build and design, the WA-44 is manufactured with exacting quality standards to match the most prized original 1930s-era RCA 44BX vintage mics. The WA-44 ribbon is 99.1% aluminum, true-to-length, 2.5 microns-thick, and custom-crafted in Japan. Paired with the ribbon is a heavy, true-to-size Neodymium magnet designed to create a strong magnetic field capable of delivering nuances and detail in the midrange. The ribbon and magnet are powered by a USA-made CineMag transformer built to reproduce true-to-vintage tone with added modern reliability. Weighing in at over six pounds, the WA-44 revives this classic design with a premium build of intricate and rugged metal work that is ready for everyday studio use and abuse.

(Warm Audio, 2026)



Crystal Microphones:

Crystal microphones operate on the piezoelectric effect: when mechanical stress is applied to certain crystalline materials, they generate a proportional electrical charge. This eliminates the need for phantom power, batteries, or internal circuitry—making them inherently passive, robust, and immune to electromagnetic interference. Their frequency response tends to emphasize midrange presence while rolling off extremes: typically, 100 Hz–8 kHz, with a pronounced peak around 2–4 kHz that lends vocal recordings a distinctive “telephone” intimacy or acoustic instruments a crisp, articulate edge. Impedance is high—often 50 kΩ to 1 MΩ—so they require high-impedance inputs (like vintage tube preamps, guitar pedals, or dedicated crystal mic preamplifiers) or impedance-matching transformers. Using one directly into a standard XLR input will result in severe high-frequency loss and weak output.

This isn’t a limitation—it’s a design signature. The crystal mic doesn’t compete with a Neumann U87; it serves different purposes. Its strength lies in transient accuracy, low self-noise (no active electronics to hiss), and immunity to RF noise—critical in environments where Wi-Fi routers, LED lighting, or motor controllers introduce digital hash. As Dr. Lena Torres, Senior Researcher at the Audio Engineering Society’s Transducer Division, explains:-----

(White, 2026)

“The crystal mic’s ‘flaws’—its narrow bandwidth and high impedance—are precisely what make it invaluable for targeted applications: monitoring bearing harmonics in rotating machinery, capturing percussive attack on hand drums, or teaching students the direct relationship between physical vibration and voltage generation. It’s not a replacement—it’s a specialist tool.” — Dr. Lena Torres, AES Fellow & Piezoelectric Transducer Research Lead

Crystal Microphones:



700A, 701A, 702A

The cover of the 1937 Shure Microphones and Accessories catalog reflects the popularity of the Streamline Art Deco design trend in the mass production of everyday products. These crystal microphones boasted the identical Shure-engineered “outstanding features” – “Ultra” wide-range reproduction, screen-protected cartridge, “Moisture-Sealed” high capacity Grafoil crystal, high output, curvilinear diaphragm – in Spherical, Swivel and “Grille-Type” designs. Used in military applications, a Model 700A could have changed the course of history when, on December 7, 1941, a radar operator radioed commanders at Fort Shafer in Honolulu, Hawaii of the presence of Japanese planes 132 miles north of Oahu. The lieutenant taking the message instructed area radar operators to “forget it”.
(Shure.com, 2020)

Model 708A

In 1940, the Model 708A “Stratoliner” joined a family of the Shure microphones with fanciful names that eventually included the Spher-o-Dyne, Rocket, and Monoplex. The airship (or zeppelin, blimp, dirigible) – inspired design of the Model 708A crystal microphone was shared with the ribbon Model 508 that also debuted that year. In addition to its sonic qualities, the Shure 1940 catalog touted the 708A’s good looks, stating that it also improved “the appearance of sound set-ups.” Production of these mics was suspended from 1942-1946 to conserve materials for World War II. The 708A was revived after the end of the

(Shure.com, 2020).



Carbon Microphones:

Carbon microphones were an ideal choice of microphone in the early days of the telephone. They were widely used in telephone applications because they gave a high output which meant no amplification was used. As radio started to be used, the carbon microphone was initially used there as well – for broadcasting as well as communications purposes. However, their use in broadcast applications soon came to end because of the drawbacks of noise and poor frequency response. Other types of microphone started to become available, and their use was preferred because of the better fidelity that was available. The use of the carbon microphone persisted for many years for communications purposes as they gave a high output and they were robust. The poor frequency response was not an issue.

(electronics notes, 2019)



Amplifiers:

An electrical circuit which transforms small voltages and currents (line, level), into much larger ones that are sufficient to power a loudspeaker.

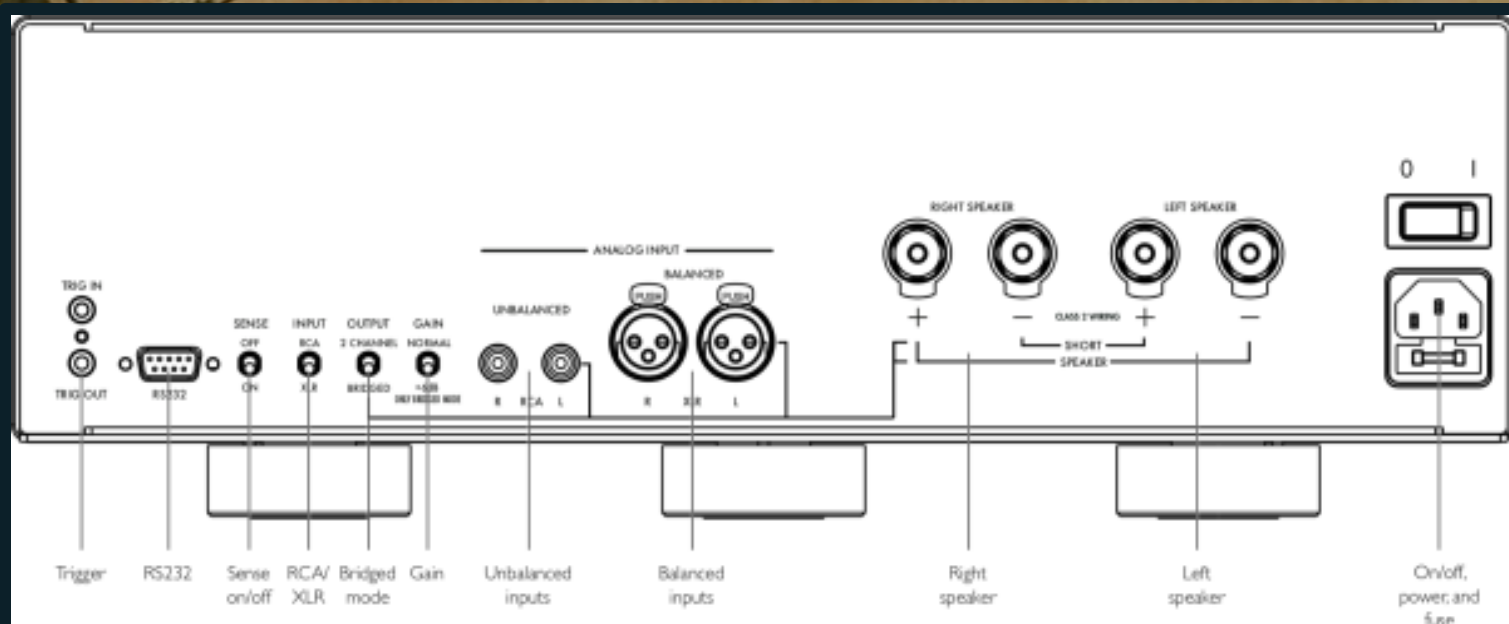
Amps are qualified in terms of watts, either in terms of peak power or RMS(power expressed as Root Mean Square). Manufactures, figures can be misleading as the output volume is determined by the resistance of the loudspeakers(measured in ohms) and the power rating of an amplifier. The lower the resistance of the speaker, the greater the power of the amplifier and the higher the quality of sound reproduction.

(Palmer, 2006)



To turn on the amp:

- I. Ensure all sound equipment is switched on.
- II. Turn on mixing desk, ensure faders are down.
- III. Check amplifier volume levels are set to 0.
- IV. Turn on power to the amp rack and check fans are working.
- V. Turn on individual amp power switch and set volume controls.
- VI. Bring up faders on the mixing desk. *(Palmer, 2006)*



To turn off the amp:

- I. Bring down all the faders on the mixing desk.
- II. Turn the amp volume control to 0.
- III. Switch off individual amps.
- IV. Turn off all power to amplifier racks and fans.
- V. Wait till amplifier lights go out before switching off mixer and other audio equipment.

(Palmer, 2006)

Loudspeakers:

A loudspeaker works in the opposite way of a microphone. whereas mics convert sound waves to electrical signals, a speaker converts electrical the electrical energy into audible sound waves.

In a sound system, these electrical signals have been processed by the mixing desk and magnified by the power amplifiers to a level that is sufficient to drive the loudspeaker cones. Three main parts inside a typical speaker:

- ❖ magnet
- ❖ cone/driver
- ❖ cabinet/baffle

The quality of the loudspeaker housing is also important. baffles are required to assist in directing the sound and to prevent low-frequencies from re-entering the loudspeaker at the rear of the cabinet. the housing/cabinets are made from heavily absorbent materials and include air vents which serve to equalize the air pressure and prevent vibrations which would give unwanted resonance to the sound.

Loudspeakers, like microphones, are designed to respond in specific ways. a speaker with a single cone can't be expected to respond accurately to a wide range of sounds. many speakers incorporate two or more cones of differing diameters within a single cabinet. Typical hi-fi speakers work this way with 'tweeters' and large 'woofers', placed together in the same cabinet. These are designed to respond to high and low frequency sound, respectively. Some professional loudspeaker units are manufactured to provide a good response to all frequencies. These incorporate a variety of cones within the speaker cabinet. Other speaker units are designed to respond to specific frequencies. Horn units are used for high frequency sound reproduction, whilst larger bass bins are dedicated low frequency units.

(Palmer, 2006)

The Bose 802 loudspeaker is a popular 'general purpose' loudspeaker designed specifically for the theatre and entertainment market. Whilst speakers like this are sufficient in providing the main sound for smaller theatre spaces, larger venues will require more powerful systems with dedicated loudspeakers for separate frequencies. (Palmer, 2006)



More sophisticated sound reinforcement involves splitting the audio signal into separate frequency bands and feeding these signals back to separate loudspeaker units designed to respond to high, mid and low frequency sounds. In permanent sound instalments these speaker units are often built into the building, around a proscenium arch for example- known as a line source column. In rock concerts and other events where a temporary sound rig is required, a range of loudspeaker units are built on top of each other(stacked).

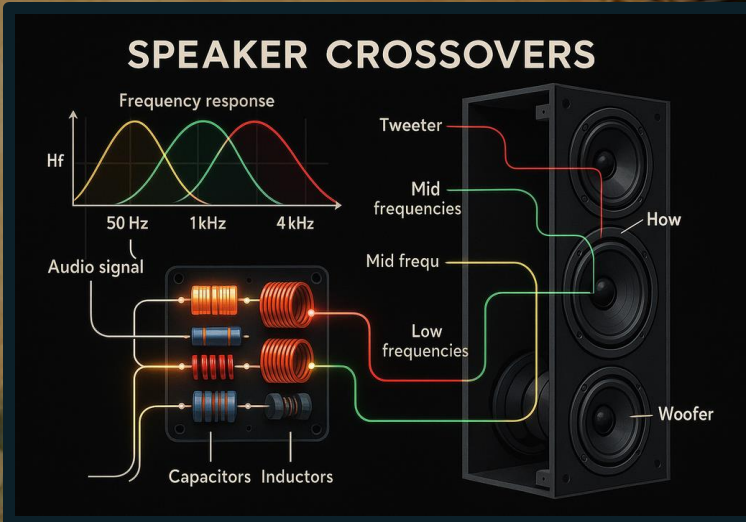
(Palmer, 2006)

Crossover Units:

The crossover unit is required to split the audio signal so that the appropriate frequencies are sent to the relevant speaker cones. Some crossovers are built into the loudspeaker cabinet, but in professional sound PA installations, the crossovers are separate external units.

Crossovers can either be passive(set at a fixed frequency) or active(able to be set to respond at a variety of alternative frequencies).

(Palmer, 2006)



Bl amplification:

This is a process where the crossover splits up the frequencies before the signal is amplified. This process gives a better quality sound with less distortion. However, it is more expensive since it requires a separate amplifier for each individual loudspeaker unit.

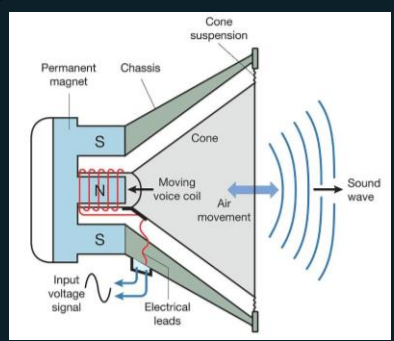
(Palmer, 2006)

Loudspeakers:

There is perhaps no other area of sound that is more controversial than the positioning of the loudspeakers. This is mainly due to pure ignorance of the fact that speakers have a specific 'beam'; a known pattern of horizontal and vertical angles of the radiation of the sound. The loudspeaker requires careful positioning and aiming in the same way that a spotlight would.

There are two sections which make up the moving coil loudspeaker; the unit which provides the movement itself, often called the cone/driver, and the cabinet/baffle which harnesses and projects the sound. The driver consists of a magnet which is specifically shaped to concentrate the field at the suspension point of a coil wire which is in turn connected to the amplifier. The actual loudspeaker cone is then mounted onto the coil so that it moves back and forth as the magnetic field generated by the sound interacts with that of the main magnet.

(Walne, 1990)



The performance of a loudspeaker can't be judged by that of the cone alone as its housing can emphasise much of the sound. The problem is most apparent at the low frequencies where the long wavelengths can bend around the cone and cancel each other out and as a result the sound is lacking in base.

(Walne, 1990)

The cone can't be mounted on a board (baffle) alone, because the wavelengths of extreme low frequencies are so large, 22', that they would bend around the ends of the baffle unless it was more than 22' long. The cones are enclosed in cabinets which are heavily absorbent inside. A lack of absorption creates too much bass because of the resonance (sympathetic vibrations) of the air inside the cabinet. Most professional units have vented cabinets which are carefully designed so that the sound from the interiors emerges in phase with that directly radiated outside and is therefore reinforced.

(Walne, 1990)

The design of such enclosures is very much a specialised subject and computers have proved useful in previous years in calculating how compact an enclosure can be for a given performance. It may be recalled that low frequencies are omnidirectional and that high frequencies are unidirectional and therefore the 'beam' of the loudspeaker changes with the frequency, the lowest frequencies radiate in all directions; the middle will mostly radiate from the front of the speaker in a 180 degree angle, and the high frequencies will radiate from the front at a lesser degree than the 180.

(Walne, 1990)

Generally, the beam angle is taken as the boundary at the sound pressure level falls 6dB from that measured on the axis at 1 metre to the unit, hence the beam angle is more commonly known as the '6dB down point'.

Frequency response=50-18000Hz
SPL 1 watt 1 metre pink
noise=101dB

	<u>Vertical Angle</u>	<u>Horizontal Angle</u>
1000 Hz	180	113
2000 Hz	128	130
4000 Hz	86	112
8000 Hz	70	116
16000 Hz	50	102

The issue with a single moving coil loudspeaker, a point source, is that the sound is dispersed indiscriminately so the reflections from the auditorium's side walls can reduce intelligibility and push the system closer to feedback. Point source designs also follow the 'Inverse Square Law' that the sound pressure level falls 6dB every time the distance is doubled from the source, therefore sound levels at a rear stalls control desk might be unacceptable nearer the stage and the speaker. An alternative loudspeaker design, the line source column speaker, overcomes these mentioned problems to a certain extent and its slim lines often make it easier to conceal. In the line source column, several cones are mounted vertically, and the full power is fed only to the centre cones, less to those above and below the centre, then less again and so on. This produces a very directional beam which makes it ideal for theatre work. This technique is known as 'Power Tapering'.

Another issue is that if the high frequencies are produced by all the cones in the column, then the result will be much narrower than those of lower frequencies. This means some people may not receive the full frequency response. In another form of tapering the full power is fed to the top cones and then progressively less down the height until the bottom cones receive the least power. This produces less variation in the beam angles with frequency.

The beam from a line source column is wide horizontally and narrow vertically.

(Walne, 1990)

Cables And Connectors:

(Palmer, 2006)

Most source units use phono connectors:



These were similar to the connector we used for the headphone channels.

A variety of connector types are used to join sound equipment together. Some connectors simply push in to connect; others lock in place. These are released by pressing on a small lever.

Quarter inch jacks are used extensively to connect items of sound equipment. Headphones and electric guitars use stereo jacks of this nature:



Most microphones use a three pin XLR connector:



Miniature variations of the jack such as the 3.5mm plug are found on small professional and domestic equipment such as portable MiniDisc and personal stereos.



Loudspeakers use a variety of types of connectors; some connect simply with bare ends of wire to binding posts. Others require small banana plugs or quarter inch two-pole jack plugs but locking connectors such as XLR type or Speakon locking connectors are preferred, since they are more secure.

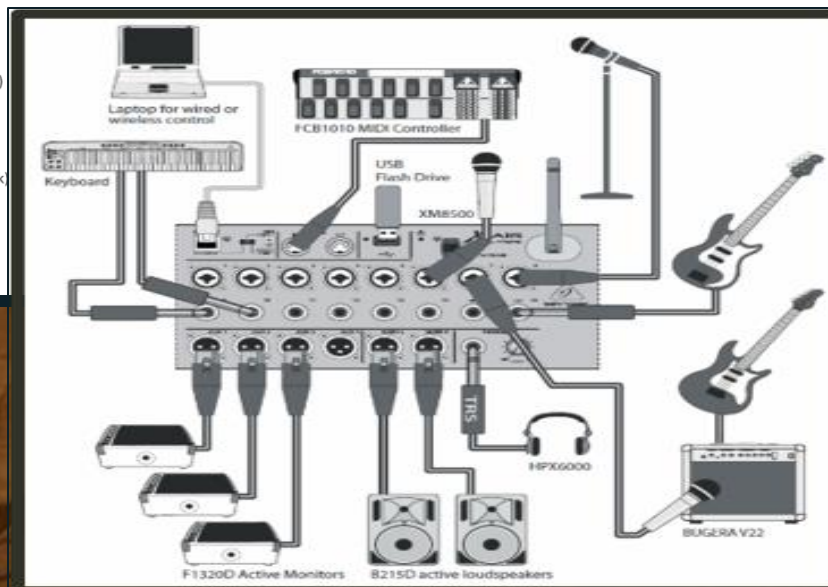
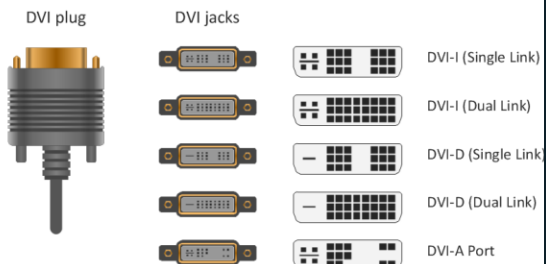


Jackfields and Patchpanels:

In sound installations, such as a recording studio or a theatre control room, where the equipment will be installed on a permanent basis, each unit of the sound chain is permanently linked to a patch panel,



Cables And Connectors:



Name	Type	Application	Plug	Interface
TRS	*Analog Audio *Balanced	Pro Audio		
	*Analog Audio *Balanced	Sound Box, Mobile Phone, PC		
TS	*Analog Audio *Unbalanced	Guitar, bass, keyboard		
	*Analog Audio *Unbalanced	Headphones, violin, electric guitar		
XLR	*Analog Audio *Balanced	Microphone, sound card, speakers		
RCA	*Analog Audio *Unbalanced	TV, audio, mixer		
S/PDIF-RCA	*Digital Audio *Unbalanced	Digital mixing consoles, interface boxes, wireless devices		
BNC	*Digital Audio *Unbalanced	Digital mixing consoles, interface boxes, wireless devices		
OPTICAL	*Digital Audio *Unbalanced	Sound card, digital TV		
MIDI	*Digital Audio *Unbalanced	Recording equipment, computers		

(<https://www.conceptdraw.com>, 2026)

(www.utmel.com, n.d.)

Balanced vs Unbalanced:

The cables used in an audio system—and how they're put together—can have a major impact on the sound of the system. Every cable in an audio system has the potential to add noise and to compromise the sound quality of the components it connects, so it's important to use the right cable for the right job. That starts with understanding the kinds of signals the cables are carrying.

There are two main issues to consider here: the level of the signal and the signal type. We'll set aside signal level for a future post and focus for now on whether the signals are balanced or unbalanced. (Aviom, 2014)

Unbalanced Cables and Signals

An unbalanced cable consists of two connectors with two conductors each, connected by two wires inside the cable—a signal wire and a ground wire. You can quickly (in most cases) identify a cable designed to carry an unbalanced signal by its connectors: because each wire has to terminate at the connector with its own contact point, an unbalanced cable requires only two conductors at the connector. A standard TS (or “tip-sleeve”) guitar cable is the unbalanced cable you'll run into on stage most. Standard RCA cables used for many AV components are also unbalanced cables.

Inside the cable itself, the signal wire is typically in the center of the cable with the ground wire surrounding it. The ground wire serves two functions—it carries part of the audio signal and serves to shield the main signal wire to some degree from outside interference from noise such as the hum from lights and transformers, as well as RF (radio frequency) interference that comes from TV and radio transmissions. It does a decent job of rejecting noise, but unfortunately, the wire itself also acts like an antenna and picks up noise.

(Aviom, 2014)

Unbalanced cables work great for connecting a guitar to an amp, for instance, but because they are not very good at suppressing noise from outside interference, unbalanced cables should have a maximum length of 15-20 feet (4-6 meters), especially when used in noisy environments and with signals that are low level to begin with, such as those from keyboards, guitars, MP3 devices and so on. (Aviom, 2014)

Balanced Cables and Signals

A balanced cable, by contrast, has three conductors in the connector and three wires in the cable: two signals' wires plus a separate ground wire. As in the unbalanced cable, the ground wire still surrounds the signal wires and is used as a shield against interference. But what makes a balanced cable special is the way the gear utilizes that extra signal wire.

A balanced XLR cable (above) showing its two signal wires and its ground (with a foil shield) compared with a typical 2-conductor TS guitar cable (below).

Balanced cables use two signal wires; both carry a copy of the signal, but the two copies are sent with their polarity reversed. If you sum two signals that are identical but are reversed in polarity, the signals cancel out, leaving you with silence. (Just like adding positive and negative numbers: +15 added to -15 equals 0.)

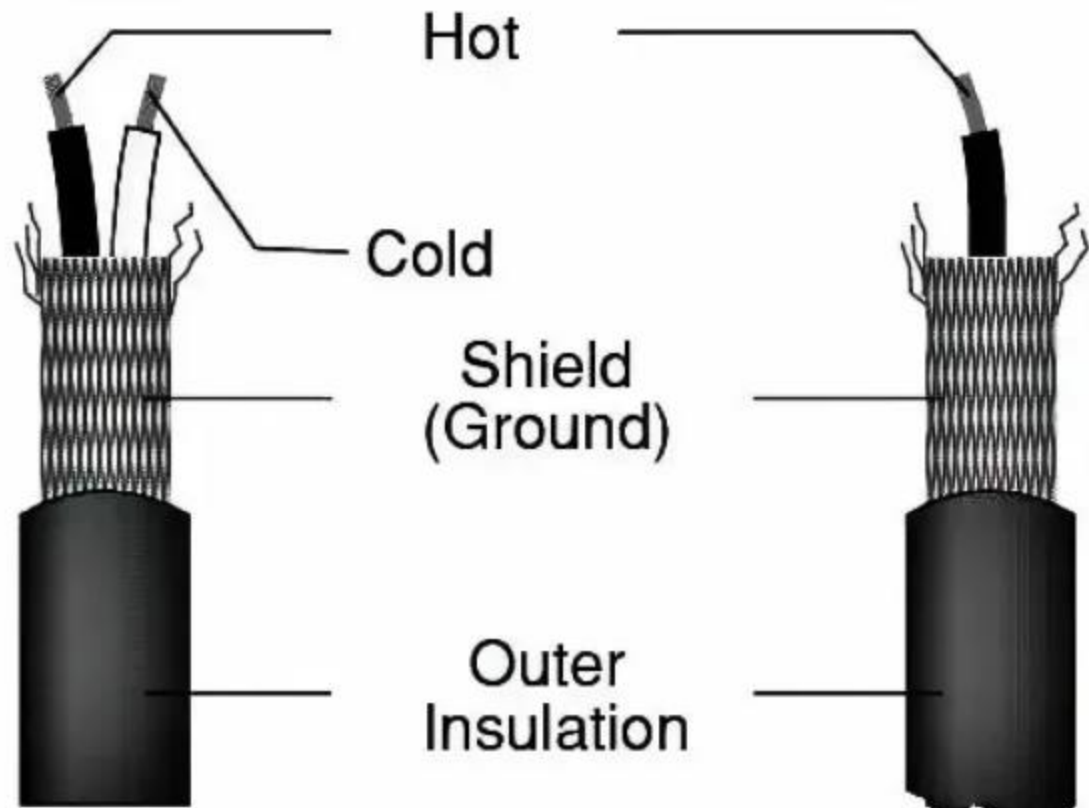
So why would you want audio gear that flips the polarity of your signal? In this case, because the receiving gear will flip the inverted signal back into its original orientation. But because both copies of the signal picked up the same noise as they travelled along the cable—and that noise is identical on the two wires in the cable—flipping the polarity of what arrives at the receiving gear will produce the original signal intact and noise which now has reversed polarity. Summing that gives you a welcome result: signal that's preserved and noise that's cancelled.

Because of this, balanced cables can support much longer cable runs; 50 to 100 feet (15-30 meters) is not uncommon, though even shorter runs will often use balanced wiring to protect against noise. The wiring for microphones, and the interconnect cables between consoles, signal processors, and amps, etc., in a pro sound system or recording studio environment are typically of the balanced variety. Standard connectors designed for use with balanced signals are XLR and TRS (or “tip-ring-sleeve”).

(Aviom, 2014)

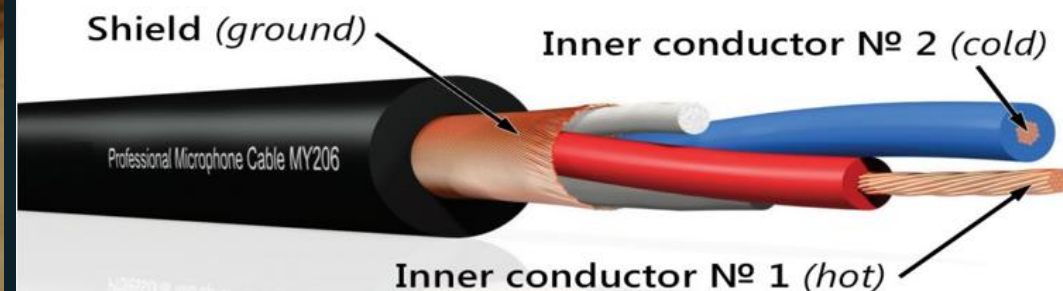
Balanced

Unbalanced

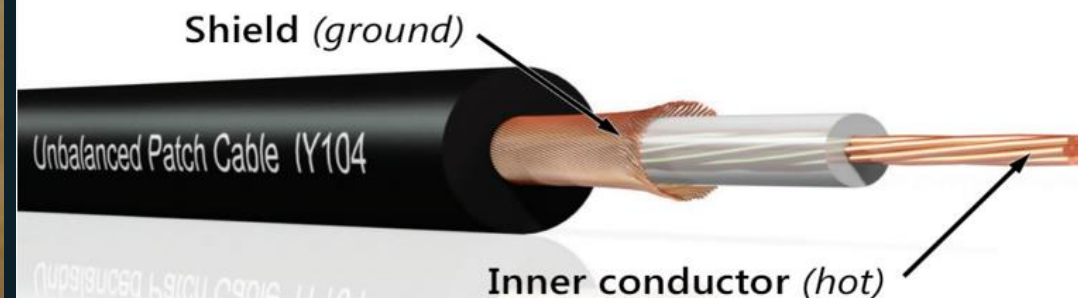


(Sinbosenaudio.com, 2022)

Balanced cable



Unbalanced cable



What is the difference between a balanced signal line and an unbalanced signal line?

Unbalanced signal lines are more likely to introduce noise and interference. If you cut an unbalanced signal wire, there are 2 wires inside: 1 conductor and 1 ground. Balanced model line is just the opposite. It is designed to eliminate noise and interference. It does this by adding a conductor: 2 conductors and 1 ground wire. With the extra second conductor, the noise on both conductors is eliminated.

(Sinbosenaudio.com, 2022)

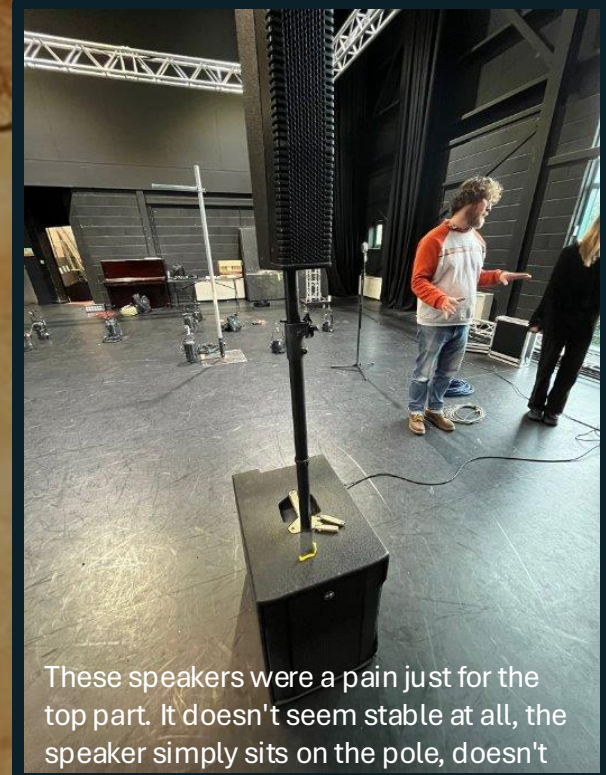
Our connect-it-up-session.



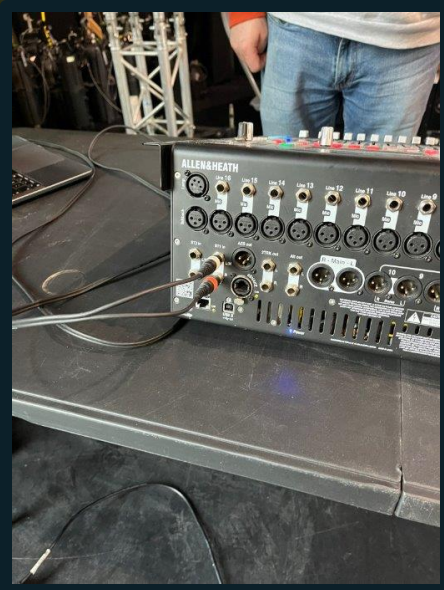
An analog sound board. Older than the digital one we used for our Foley project. I liked the digital one better. It had lights on it.

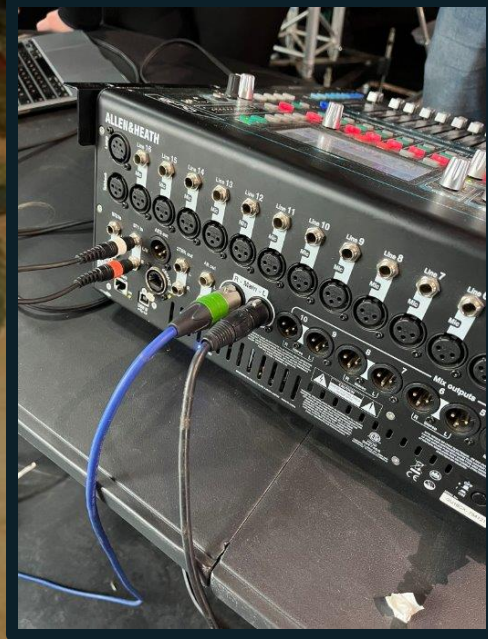


For health and safety and neatness (Not really needed for the latter purpose but it does help to have it visually pleasing and neat) the wires must be taped down, especially in the walkways or doorframes. In a place with heavy foot traffic and set pieces or other heavy equipment is moved around, a ramp may be needed as the tape isn't enough to keep the wire down. Never run the power cable with the speaker wires as audio quality issues will immerse due to electromagnetic interference.



These speakers were a pain just for the top part. It doesn't seem stable at all, the speaker simply sits on the pole, doesn't seem safe at all. But it didn't fall so.....





The male and female ends clicked nicely into place. It was quite a simple setup, but I suppose it was something for us to be introduced to whilst learning the names and such.

We were also shown how to properly coil up the wires in a way to help preserve them for a longer lifeline. Thread it through your hands and coil the wire the way it wants to be coiled. Roll it in your hand if needed and for the larger cables, lay them out in a figure-8 then fold it over on itself. That them all off the keep them neat.

My Favourite Band:
Skillet
Their 2014 Tour



Photos Credit- Jeff Harris

In 2014, supporting Christian hard-rock band Skillet's tour with rappers TobyMac and Lecrae, the LEO system gives the Blackhawk crew and FOH engineer Robert Taylor the tool to deliver an exceptional live experience show after show in amphitheatres across North America.

"LEO is perfect for what we do," says Robert Taylor, FOH engineer for the Skillet tour. "You can feel the drums and the guitars, and the bass guitar has never sounded better."

The standard configuration for the tour is 16 LEO-M line array loudspeakers per side, with two MICA line array loudspeakers per side used for down fill. Out-fill arrays consist of up to 10 MICA loudspeakers each, and 16 1100-LFC low-frequency control elements supply low-end reinforcement. The tour also carries four 700-HP subwoofers and four JM-1P arrayable loudspeakers for side fill. A Galileo Callisto loudspeaker management system with one Galileo 616 and four Galileo Callisto 616 array processors handles zoning, drive, and alignment.

For Taylor, who first mixed on LEO when Skillet played a festival the year before, the system has been a welcome new foundation for the band's shows. "When we first fired up this rig and started line-checking, people were walking around with huge grins on their faces," he recalls. "The sound is big, full, and in-your-face, but never harsh. The subs get down really low, under 40 cycles with no problem, but they stay musical while they're doing it."

An Avid SC48 console is chosen for both FOH and monitoring mixing. The tour is also carrying Shure UHF-R wireless microphone systems and IEMs for Skillet, with additional Sennheiser G3 systems for opening acts. Scotty Rock is the tour production manager, and Ted Daniels of Blackhawk Audio is system tech.

Jamie Nixon, director of touring and marketing for Blackhawk Audio, finds LEO to be a perfect match. "Skillet puts on a very high energy show, and the LEO system finishes the way it starts—with a full wall of sound."



2009, Skillet, Awake, which was produced by Grammy-nominated Howard Benson, has been a considerable success, and the band was in the middle of the Monsters of Annihilation Tour with alternative rockers Papa Roach.

In addition to the heavy demands that touring places on his schedule, guitarist Benjamin Judah Kasica also operate the busy recording studio Skies Fall Studios which is involved in projects for Skillet as well as those of other up and coming acts that year.

In those months, he's found a new "go to" microphone—the MA-200 Vacuum Tube Condenser Microphone from Mojave Audio.

"While we tend to gravitate toward big name producers for our records," said Kasica, there's plenty of pre-production engineering and similar work that I handle directly."

"I've been engineering for roughly the past seven years. During that time, I've had the good fortune to work with a number of acts that are now signed and I also helped with engineering on a project that we recorded as a live iTunes exclusive titled Skillet – iTunes Sessions."

"Similarly, I engineered a few songs on Skillet's forthcoming re-mix EP for Atlantic Records as well as a string tribute record to be released under a different band name on Skies Fall Records. On each of these projects, my Mojave MA-200 has been an integral component of these recordings."

(Staff, 2010)



"A while back, we were recording at Chicago Recording Studios and we decided to do a blind fold comparison of several different major name microphones to see which would be best for John Cooper's voice," Kasica said.

"We were all in agreement that the MA-200 had a certain quality that brought out his voice better than any of the other mics."

"We later did the *blind fold* test again—this time to determine which mic worked best for Jen Ledger's vocals and, like before, the MA-200 was universally picked by everyone there."

"When recording vocals, I like to bring out the high end, airy/raspy quality of the vocalist," Kasica continued. "Some vocalists naturally have this character while with others; you coax it out with some EQ and the right preamp."

"Before using the MA-200, I frequently added EQ in the 8 – 15 kHz range but always had to be very careful not to add too much brightness. With the MA-200, this is much less of a challenge. The mic has a very nice quality in the 10-15 kHz range that really helps draw the upper range vocal character into focus."

"I find that with fairly close, on-axis positioning of the mic, I get a full-bodied quality—without any 'boominess'—that has just the right amount of high end."

Kasica also reports using the MA-200 for acoustic instruments, "I've had great success using the mic on both acoustic guitar and cello. I've really become very fond of my MA-200."

"In all honesty, I haven't encountered a single issue with this mic," he said, "but any questions and other correspondence have always been handled very quickly. Dusty Wakeman understands what I'm looking to accomplish and has been great at offering suggestions and support."

(Staff, 2010)

Group Foley project:

Tasked with creating our own foley art to play over a video provided by Dave, I was grouped with Annabell and Eirys. This was our video:



Group Foley project:



It can be difficult to create a watery sound without water, so these sounds were made from water poured into the deeper part of a paint tray. At first the sound was too quiet, and we didn't have the sound of something soaked splashing around. We did end up 'borrowing' blue tissue paper from the bathroom. It was a subtle change but was needed as us using our hand just wasn't right.



Breaking down the video, we have the first scene. This consists of someone walking through watery sand, presumably at the beach and peeling off their wet sock before patting the foot down on sand. Starts at 0:00 and finishes at 0:36.

The peeling of the sock wasn't a sound I really wanted to replicate as it looked disgusting, but that hardly matters in the long run. We just wrung out the wet tissue.



I donated some of my hair mousse for the walking on sand. I pressed some out of the can on Annabell's hand and she used her other in time with the steps on the sand in the video. It created a soft almost patting noise, and I discovered it when I was trying to defrizz my hair the night before. It didn't matter that it had a nice scent, but it was pleasant.



To make the sound of someone walking in wet socks sinking in and out of wet sand Eirys squeezed the water out of the soaked tissues on the drier side of the paint tray.



I suggested we do something to immerse the audience in the scene as much as possible. This was as simple as blowing on the mic. Proving difficult to do the previously mentioned sounds and the background ones at the same time so we hooked up a second microphone. And during the assessment I would hold the mic and blow while keeping an eye on the sound levels and adjusting as needed. Stacey mentioned she liked this method and referred to it as 'layering'. Stacey, Mini Dave and Mei were our first audience during our rehearsal.

My mic.

Group Foley project:



The second video consisted of a man hammering a nail into a piece of wood. Start time is 1:30 and finishes at 2:15.



The next part showed a woman set up before a camera and a tray of lettuce with ranch dressing. She would dip in in the sauce and then bite and chew into the mic for an ASMR video. Time start at 2:56 and finishes at 3:48



This one was quite frustrating as this one was the most difficult one for us. Most of the stuff we tried sounded too tinny or too hollow. Eirys was trying to think and was repeatedly tapping against the steel cap boots. We decided it still sounded too muffled. A hammer is anything but so I handed over my sharpie which sounded better. I played around with the frequency of the mic to help pronounce that sharp metal-on-wood motion.

To mimic the sound of him gripping the wood (hehe) Eirys just aggressively grabbed her boot.



The timing was also annoying to get right as the man in the video repeatedly teased us by bringing the hammer near the nail but didn't hit it and waved it around instead.



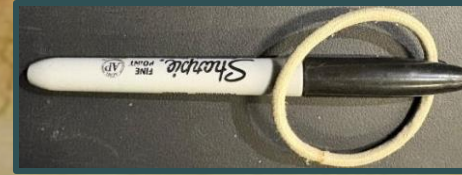
The ranch dressing dipping was made from wet electrical tape being squeezed together by Annabell. I had kept an eye on the levels and lowered the plastic slightly as there was a slight carry in the mic.

Another happy accident was the discovery of lettuce sounds. One of us had just stood on a piece of plastic that made a crisp crunching sound. So, our video now has very crispy lettuce. The only issue was trying to figure out how to make the slightly muffled chewing and crunching on the lettuce and while making sure how to do it in time with the video. Our solution? Put the plastic in a plastic cup. To make the chewing sound, gently pinch the cup.

Group Foley project:



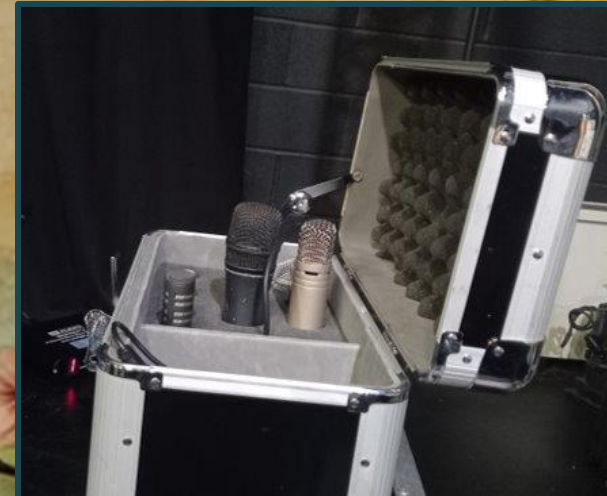
Balloons come into frame at the time 4:42 and finishes at 5:07. Someone kneels down next to the small balloon tower, gripping the rubber and shuffling them around before popping them with a pin.



The balloon popping was well thought out and not a happy accident sadly. We needed to try and get that sharp bursting sound, so we snapped a hair tie on the ground. Too soft and didn't carry the slight echo. On the table? Better, now it has the sound carry through the mic. Still slightly off, slightly muffled. Is the sound muffled by the hands? Try it with the same sharpie. Ding, Ding, Ding.



While shuffling through the mic options, I ran my hand across the foam on the inside of the mic box's lid. I just wanted to feel it. This occurred after we played around with the paint tray for the wet beach sounds, so my hand was wet. The noise that came from this was a slight shuffle of textures together followed by small squeaks that sounded very much like the rubber on balloons.



Group Foley project:

The Scooby Doo cartoon sequence had a start time of 6:02 and finishes at 6:28. It consisted of the characters running back and forth, opening and closing doors.



A reoccurring theme I have noticed is that most of these sounds are ones you simply stumble across. The doors opening and closing sound came from when we tried to move a wheeled box with handles. The lifting of the handle made a squeaking hinge noise and upon releasing it slammed down with a thud that echoed slightly in the empty box. It fit the scene perfectly but given how loud the slam was we had no use for the mic. Annabelle and I had to tag team it. I matched it up to the right side of the video and she did the left.

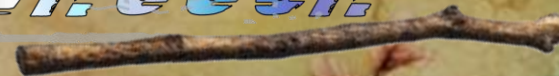


For the collision at the end of the sequence, we wanted a sharp clash to make it cartoonish. A gong and drumsticks were harvested from the props room and The mic left next to it.

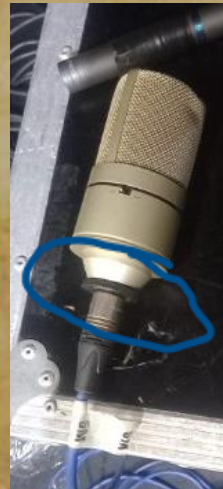


I do regret that we didn't play some noise for the running back and forth or for the wheelbarrow rolling. I remember my little sister used to have a pair of roller skates that would squeak down the hallway, these may have worked for it.

WHOOOSH



For the pause where this character whipped his head around at a rapid pace, Eirys twisted a part of the mic that made a swish sound. In all honesty I would have preferred a more wind whistling past whoosh. Slicing something through the air might have done it.



Group Foley project:



These were the frequency settings we were left with after messing around with the dials for less feedback. This proved slightly difficult as there was slight static omitting from the headphones we used.

Channel four was used for the other mic.

Channel 5 was used for the mic I used, the one on the right.



Q-Lab

The Sea

Edward Bond

Beach. Before the curtain. Almost complete darkness. We hear the sound of a storm raging: thunder; wind roaring, whining, crashing and screaming over water; masses of water swelling up, rattling, churning and crashing back into the sea, gravel and sand grinding slowly; the earth trembling. Offstage, as if from the sea we hear Willy screaming for help.

Project
Brief

I hate Q-Lab. Just gonna throw that out there. I hate MacBooks. There's no good reason for them to be that annoying to work with except for sick people who get pleasure from watching others struggle with something that should be simple. MacBooks are mean.

This lad had a semi-coherent tutorial for it:

<https://www.youtube.com/watch?v=a9t91hAXs0o>

That was just part one, but it did help.

<https://www.youtube.com/watch?v=trD-qP1Qv0c>

This one shows how to group cues.



QLab

Summary of 'The Sea'

The play begins with the storm in the sea where Willy is trying to save his friend-Colin, a native of the town. When he sees Evens, the mad man or perhaps seer, and the draper, Hatch, he does his level best to call them for help but Even utters nonsense while Hatch tries to threaten Willy. Basically, Hatch is under the illusion that some aliens would come by the route of sea to rob and rule the world. Therefore, the wild storm and presence of humans are beyond his understanding. Therefore, he does not help them. The Mrs. Rafi, a middle-class lady greater influence over the town and its people, is seen with her authoritarian mode of dealing with Hatch. She is at his draper shop for some buying. During her conversation with Hatch, we come to know that she is social worker too. She has appointed Hatch as the coast guard. She questions him where he was when the man named Colin was drowned. Here Hatch lies that he was not there in that storm. She places a heavy order of cloth which Hatch is to import from abroad. However, Hatch is very happy to have this order. She treats her servants like children. Mrs. Rafi is rehearsing the play she is to perform for raising coast guard fund. At this moment Willy comes to visit her. He tell her in detail of what happened at the sea. He even mentions the names of persons that did not help him in saving Colin. Mrs. Rafi goes to the shop of Hatch and inquires but he denies having done anything of the sort. The corpse is found eventually. Willy and the fiance of Colin are present there. They see the corpse and set out for obtaining some piece of cloth to wrap it. When they are away Hatch comes and sees the dead body of Colin, he begins to hit it attack it with knife deeming it an alien. Because he believes that aliens reside inside the dead or alive once they have captured them. Hatch runs away when he sees Willy coming. Later Mrs. Rafi refuses to collect the piece of cloth ordered by her. Hatch begs her to collect because he has invested his all in importing that cloth. He pleads but to no avail. Mrs. Rafi refuses to trade with him. He, out of desperation, wounds her and runs away from the town to the beach. Later he is arrested and sent to the police. Mrs. Rafi advises her niece, the fiance of Colin, to go away from the town because it seems to have been haunted. Nothing changes there so she needs to leave the town with Willy. Willy accepts this and goes away with her from the town in the search of change.

(Ijaz, 2024)

Q-Lab

I was in a group with Anabelle and Eirys again and we each pitched in to make the group moodboard.

<https://youtu.be/vKqgxkQpW2M?si=AjXCAj96PRspSjq5>

This was one of the links used for our q-lab cues

We overlapped music for the drama. Had the raging storm appear from YouTube videos and I sourced the screaming from YouTube aswell under the title of 'Skinwalker calling for help caught on camera'. It's very original. Most of the moodboard pics were sourced from Pinterest. There was a bit we wanted to add that would fade down all cues to make way for one specific one that was a deep sea with a whale call audio that would have hopefully replicated someone sinking beneath the waves as Colin would have been doing but unfortunately, we didn't have the correct licence to make this happen so that was a little upsetting.

"Help. Aaahhh.... (His cry is drowned by the sound of water.) Help. Colin. Shout. Oh, God, make him shout. (The sound of the tempest grows louder.) Help. (His cry is again drowned by sound of water.)"

Wind roaring

Storm raging

Earth trembling

"They aren't sailors, they aren't even real storms."

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Lighting Design



Importance of lighting design:

Required by any dramatic production, unless preformed outdoors in the daytime. There is more to the subject then just illuminating the stage, effective lighting ties together the visual elements of the production and helps set an appropriate mood and atmosphere that can heighten the audience's understanding and their enjoyment of the play, if the lighting is done well. It is an art form that contributes significantly to the storyline.

- Visibility: At its most basic, lighting ensures the audience can see the performers and the set. Good lighting makes it possible to focus attention on the main action and ensures that facial expressions and movements are visible, even to those seated far from the stage.
- Atmosphere: Lighting is a powerful tool for setting the mood of a scene. It can evoke emotions, from happiness and tranquility to tension and fear. For example, warm, soft lighting can create a soft, intimate atmosphere, while stark, harsh lighting can convey a sense of danger or unease.
- Guiding the Audience's Attention: Lighting directs the audience's focus to where it needs to be at any given moment. It can highlight a single individual, a group, or a specific part of the set, guiding the audience through the story.
- Enhancing Scenic Design: Lighting can complement and enhance the scenic design, adding depth and dimension to the stage. It can create the illusion of different times of day, change the perceived setting, or highlight specific aspects of the set.
- Creating Special Effects: Lighting is essential for creating various special effects on stage. This includes simulating natural phenomena like sunrise, or sunset, and creating abstract effects that contribute to the storytelling.
- Enhancing Performance: Good lighting enhances the performers' work, allowing them to convey their characters' emotions and intentions more effectively. It can also influence the pace and rhythm of the performance.
- Technical and Safety: Proper lighting is crucial for the safety of performers and crew members. It ensures everyone can see clearly, preventing accidents and ensuring smooth scene changes and movements on stage.

(Veloso, 2024)

Learning how to see.

Design Voice refers to the ability to express your own artistic style.

(J. Michael Gillette and McNamara, 2019)

The four controllable qualities of light:

Understanding how light shapes our perception of people and objects is absolutely essential to learning lighting design. As Tharon Musser indicates in his quote;

"If you ask most people who walk in and tell you they want to be lighting designers, what kind of weather are we having - what's it like outside? Half of them won't know how to describe it, if they remember it at all. They simply don't know how to see."

According to the book it is possible and relatively easy to train oneself to see things critically. All that's required is to begin studying and watching how people and objects are lit, then your thoughts need to correlate to this. Over time it becomes easier to notice the relationship that exists between light and understanding. Some are subtle; some are overt, but all are interesting, useful and necessary for a lighting technician to know. You must also be aware of the following questions:

- What is the light source illuminating what you are viewing?
- How bright is the light?
- Is there multiple sources?
- What direction is it coming from (direct and indirect)?
- Is the light bouncing off another surface at any point?
- Is the light hard-edged or diffused?
- What colour is the light?
- Has the light an influence on the perception of the object?

(J. Michael Gillette and McNamara, 2019)

Intensity (1)

The relative brightness of light. We are all used to changes of intensity in light; we experience them every day. It has always been the primary desire of the lighting designer to control the amount of light on stage. When electric lighting became popular, lights were connected to dimmers as a way of controlling the intensity of the lamps. While the nature of dimming technology has changed over the years, they are still prevalent in our theatres. Lights that use LED technology are still capable of being dimmed, but this is done electronically from within the luminaire.

As lighting designers, we are less concerned about how bright a light is, and more with how bright it appears to be. Of course, the actual brightness is a consideration when selecting fixtures for your show, but when you are creating the lighting, you will set the intensity (also known as 'levels') of the light to create the look and feel that you want. (Stamp, 2023)

Visibility. The lighter you have on stage, the easier it is to see the action. By simply changing the intensity of the lights on different parts of the stage, it will help guide the audience's attention – our eyes are naturally drawn to the brightest parts of the stage. We should be a little cautious here though – it is possible to create a situation where there is too much light on stage. When this happens, it can be difficult to control your audience's focus. The ability to skilfully balance the intensities of all the lights in your rig is part of what makes a successful designer. (Stamp, 2023)

Revelation of form. Some people think that the lighting designer's job is to eliminate shadows. Shadows can add depth and dimension, so it is not necessary to try and eliminate them all. When a light is at a lower intensity, the shadows can be more apparent. At higher intensities, some light may be reflected, and this will start to soften some of the shadows. If you have two lights focused on to your actor, one from each side, and one of the lights is at a lower intensity, then this will help 'shape' the actor and create a three-dimensional shape on stage. (Stamp, 2023)

Information. Brighter lighting will imply daylight, or a scene or location that would inherently have more light. Darker lighting will imply night-time or locations that might inherently have less light. (Stamp, 2023)

Mood. Generally, the brighter it is on stage, the happier it will feel – you may have heard the adage "Bright lights for comedy." Conversely, the darker it is on stage, the moodier and more ominous it can start to feel – after all, murder mysteries normally take place "on a dark and stormy night..." (Stamp, 2023)

Composition. By varying the intensities of different parts of the stage you can not only guide the audience's focus, but you can create beautiful stage pictures with a brighter light centre stage that fades out to the edges, for instance. (Stamp, 2023)

The Four Controllable Qualities of Light:

Color (2)

Theatre is rarely a monochromatic place, and color is a powerful tool in the hands of the lighting designer. Color, perhaps more so than any of the other properties, helps you achieve the information, mood, and composition objectives. While visibility determines whether or not we can see something, color determines how we see something. Careful color choices can enhance scenery and costumes, create fantasy worlds of swirling color, or conversely reduce the stage to a desolate, colorless place. Traditionally, before the introduction of LEDs, color was changed by using filters called “gels.” Filter manufacturers each have their own range of colors, both in saturates and tints, that you use to create your world on stage. Filter selection used to be an important part of the design process. You would select your colors, cut the filters to the correct sizes and then fit them to the lights. If you wanted to change a color, you would have to cut a new piece of filter, climb a ladder, and change the color on the light.

LED technology has made this much simpler: now it’s possible to change the color of a light directly from your lighting desk, and you have a virtually limitless color palette to choose from. Even though we use LEDs to change color these days, the same principles of color theory still apply.

In addition to obvious color choices for suggesting day-time or night-time scenes, different colors can have different meanings, and this is sometimes the motivation for our color choice. Sometimes, our choice of color is more subliminal – if we want to manipulate the audience’s response to what is happening on stage, we can choose colors that have psychological or symbolic meaning instead.

(Stamp, 2023)

Information:

Color can tell a story and set the location and time of day. For example, if you wanted to create the effect that the actors are sitting in front of a fireplace, you would choose warm ambers and yellows to emulate the color of the flames. (Stamp, 2023)

Mood:

The mood of the scene is largely dictated by the color choices you make. Generally speaking, warmer-toned colors (ambers, pinks, yellows, and certain lavenders) will create a happier mood on stage. Cooler-toned colors (blues, greens, and certain lavenders) will lead to a sadder or more somber feel on stage. (Stamp, 2023)

Visibility:

Color can play an important role in helping with visibility. Darker, more saturated colors will make it more difficult for the audience to see what is happening on stage. Also, the darker the color (especially when using gels), the more intensity you need to achieve similar light levels.

Revelation of form. Adding color into the shadows can add an extra level of dimension and depth to the stage.

Similar to intensity, two lights focused to the same actor in different colors will help sculpt them and make them appear more three-dimensional.

(Stamp, 2023)

Composition:

We are drawn to colors that “belong” together. We will typically choose a palette of colors that complement each other as this creates pleasing pictures on stage. (Stamp, 2023)

Color	White	Blue	Red	Green	Yellow	Amber	Purple	Pink
References and meanings	Purity, revelation	Sadness, loneliness, romance	Anger, passion, blood	Wickedness, unnatural	Warming, calming	Comfort	Sense of opulence	Love, romance
Uses	Daylight	Moonlight, night time	Strong effects	Forest & leafy scenes, evil characters	Sunlight, strong effects	Interior scenes, firelight	Effects, romance	Effect and mood

(Stamp, 2023)

Distribution. (3)

This refers to both the types of lights you have chosen and the way in which they are focused – in other words, how the light will be distributed on the stage. You may want a well-defined pool of light for a monologue, or perhaps you are just looking for an even, general wash of light on stage. Within your show, there are a number of different “looks” or lighting states that you might want to create, and several different kinds of lights that you can use. Each has its own purpose and will give you different results depending on how you decide to use them. When we talk about distribution, there are three main elements that we are referring to. The first is the type of light you are using, the second is where you choose to position it, and the third is how you choose to focus the luminaire. Each type of light has its own unique set of characteristics and properties, and as such, has a job that it is best used for.

(Stamp, 2023)

The Four Controllable Qualities of Light:

Most lighting instruments will fall into one of these categories:

- Floodlights
- PARs
- Fresnel (Focus spots)
- Profiles

When planning your lighting rig, you will need to make some decisions early on about where you are going to position your lights and what types you want in each position. Different positions will give different effects. While, in theory, it is possible to put a light anywhere, there are five positions that are used most often.

- Front light
- Side light
- Back light
- Top light
- Up light

(Stamp, 2023)



Floodlight



PAR



Profile Lights



Fresnel

The Four Controllable Qualities of Light:

Movement (4)

A change of either a single property of a single light, or all the properties for all the lights is thought of as movement. Movement in this context does not really apply to the physical movement of the light beam (something which has become very popular since moving lights became accessible) but refers to the way in which we transition from one lighting state to the other – so in this instance, movement relates to time.

We can decide whether the change from one cue to another is instantaneous – perhaps someone has entered the stage and flipped on a light switch on the set – or perhaps it is more gradual – a slow change from sunrise to a bright morning light, for instance.

Composition.

While transitions rarely have an effect on the appearance of objects on stage, sometimes you may want to reveal objects to the audience more slowly and dramatically.

Visibility.

Too many rapid changes of light can tire the audience's eyes leading to visual fatigue which may make it harder for them to focus on the action. During slow crossfades, there may be a point at the lower portions of the intensity spectrum where there is not enough light to be able to see properly.

Mood.

Rapid light changes could suggest a mood that is more aggressive or passionate and would suggest a sense of pace. Slower changes, like the gradual change from sunrise to morning light, suggest a calmer scene. Similarly, a darkening sky could suggest a sense of foreboding.

Information.

Slower changes in the lighting states could suggest that time is passing; a change from afternoon to sunset, perhaps. A more instantaneous change would be expected if an actor turned on a switch and the room lit up.

Revelation of form.

Transitions have a minimal effect on the appearance of objects on stage, although a fade from a front light to a side light would introduce more shadow, making the lighting more dramatic.

Basic Terminology

Focus:

In stage lighting the location onstage where the light from an instrument is directed.

Douser:

A mechanical dimmer with movable slats or an iris to block/allow light to pass. Typically used in fixtures with non-dimmable sources such as follow spots and intelligent/moving light fixtures.

Pipe:

A counterweighted batten or fixed metal pipe that holds lighting instruments or equipment.

Boom:

A vertical pipe with a heavy base, frequently equipped with horizontal crossbars or sidearms. Used as a hanging position for lighting instruments.

Ghost-load:

To connect an offstage, unseen load to the dimmer. An instrument, usually a 500- or 1000-watt Fresnel, is two-fared with the small onstage load to provide sufficient wattage for the dimmer to operate properly.

Light cue:

Generally, some type of action involving lighting; usually the raising or lowering of the intensity of one or more lighting instruments.

Followspot:

A lighting instrument with a high-intensity, narrow beam of light; mounted on a stand that allows it to tilt and swivel so the beam can 'follow' the actor.

Patch:

To connect a stage circuit to a dimmer circuit (hard patch) or, in computer lighting consoles, to virtually connect a channel to a dimmer (soft patch).

Dichroic Filter:

A filter that reflects rather than absorbs, unwanted wavelengths of light while allowing the desired wavelengths to pass through the filter. A red dichroic filter allows red light to pass through while reflecting all other wavelengths of light.

Lighting Sectional:

A complete side view, drawn to scale, of the set, showing the hanging position of the instruments in relation to the physical structure of the theatre, set and stage equipment; primarily used to determine effective masking positions in a proscenium theatre.

Unit set:

A single set in which all of the play's locations are always visible and the audience's attention is usually shifted by alternately lighting parts of the set.

Diffuse:

To soften the appearance of light by using a translucent filtering element to scatter the rays.

Moving Light Fixture:

A lighting fixture that can be remotely controlled to move, change colour/beam shape, and so on.

Footcandle:

An international unit of illumination. One footcandle equals one lumen of light falling on a surface area of 1 square foot.

Keystoning:

The linear distortion created when a projector is placed on some angle other than perpendicular to the projection surface.

Types of Lighting Instruments:

Floods:

The simplest instrument is the flood - a lamp and reflector in a box which can be panned from side to side and tilted up and down. This controls the direction of light. These are the only adjustments. There are no other means of controlling the beam's size or shape. The spread of light and the area covered is completely dependent upon the distance between the flood and object being lit. Therefore, the flood isn't a very selective instrument. Because of the lack of beam control, it is difficult to stop floods above the stage from lighting the masking borders to a greater brightness than the acting area; and floods from the side will have the same effect on scenic wings. The result is that the frame will be brighter than the picture and the audience wouldn't focus in properly on the actor. Older floods used a round screw-in tungsten lamp, backed by a simple spherical reflector. Although no longer manufactured, many were made before discontinuation and will continue to be found on stages for years to come.

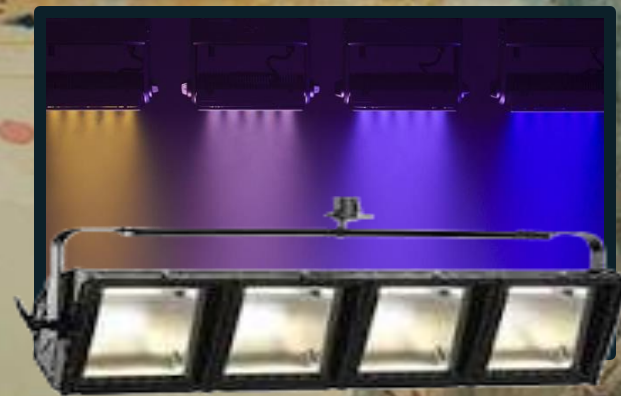
(Reid, 2001)



Strand CODA 1
500w
Asymmetrical
Floodlight - CPS



Selecon Hui 1
Flood 800w -
CPS



Linear Floods:

A longer style lamp. This improves horizontal light spread and a thin lamp allows the reflector to be designed for increased vertical light speed. Therefore, linear tungsten-halogen lamps make possible a flood that can be used close to backcloths yet give considerable spread. The standard units for large stages are 1kW but smaller versions using lamps of 500 watts and below provide a solution to backcloth lighting on smaller stages.

(Reid, 2001)



Compartment Floods:

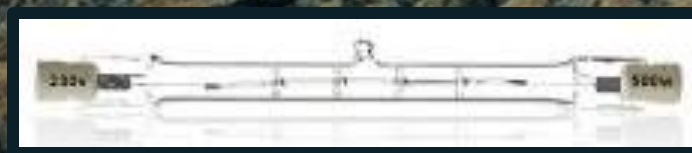
Floods can be combined during design and manufacture into multiple units with the two, three or four circuits to give a mixing possibility of two, three or four colours. When these units hang above the stage, they are known as battens (border lights/striplights); when sitting on the front edge of the stage they are footlights (or floats); and when placed on any other part of the stage floor, the term is electrics groundrow. The addition of the word electrics is necessary to avoid confusion with scenic groundrow.

(Reid, 2001)

A flood light is often the least complicated of all stage and exhibition lights due to its build. Flood lights traditionally comprise either;

- A lamp and reflector in a metal housing, with no lens – the reflector focuses the lamp through an opening in the housing – creating the flood light's effect.
- An LED light source with lenses that diffuse the light into a flood.

(AC-ET Professional Technology Sales to the Entertainment Industry, 2026)



Linear Tungsten Halogen Light Bulb 500w K1 119mm

Types of Lighting Instruments:

Spots:

To control the size and shape of a light beam, we need a spotlight. Spots have the same facility for pan and tilt as the flood but, additionally, there is the possibility of precise control of the angle of the emerging conical light beam and consequently of the area covered. It is convenient to group spotlights into families according to the type of beam control offered.

(Reid, 2001)



Fresnel Spots:

The Fresnel lens has a characteristic 'stepped' molding on one face and is textured on the reverse. This produces a very even light which is soft at the edges and tends to project a soft shadow. Because the edge is soft, it is not precise and therefore blends easily with the edges of similar spots to give a smooth coverage.

In addition, this, a Fresnel lens tends to cast some low-intensity light outside the main beam; such spill light can be a nuisance if the instrument is close to a scenery border or wing. The spill of scatter light can be controlled by a rotatable barndoor which may also be used give some shape to the beam by introducing up to four straight soft edges.

The standard British Fresnels were:

- ❖ 500 watt with 6-inch diameter lens,
- ❖ 1kW with an 8-inch lens,
- ❖ 2kW with a 10-inch lens.

The newer spots are more compact and most use lenses of smaller diameter. These tend to have more scatter than the earlier models. This is where barndoors become essential. When hanging over the stage, it's important to sufficiently plan enough space for the length of the instrument in addition to the barndoors. The doors have a nasty habit of catching on cloths and gauzes which often results in a tear, as well as knocking the light off its setting.

(Reid, 2001)



BeamZ
Pro
BTK200W
Profile
Spot
Fresnel
Light



PC Focus Spots:

The lamp moves (in simplest spots) in relation to a plano-convex (PC) lens. Most use a lens which has a light frosting on the flat ('plano') surface. This intrudes a slight diffusion which smooths the beam and gives it an edge which is positive without being particularly hard or soft. Some PC lenses have a ring of diffusion round the perimeter but are clear in the centre; this combines a soft edge with minimum stray light spilling outside the beam. PC focus spots have considerable application where their edge quality is appropriate and simple control of the beam size will suffice. The beam angle of the light cone produced can be altered by a focus knob which adjusts the distance between lamp and lens. A barndoor can be slipped into the runners of this instrument: it has four rotatable shutters which offer some shaping of the beam.

Focus spots are available in three sizes corresponding to lamp powers:

- ❖ 500 watt
- ❖ 1kW
- ❖ 2kW

In recent years this has become:

- ❖ 650 watts
- ❖ 1.2kW
- ❖ 2.5kW

Each manufacture's models have a quoted spread of beams angles, with about 4°-8° at minimum and 60° at maximum.

(Reid, 2001)



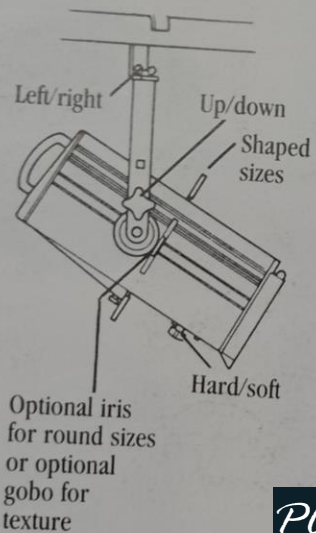
Arena PC (2k, 2.5K) with posi-slide focus



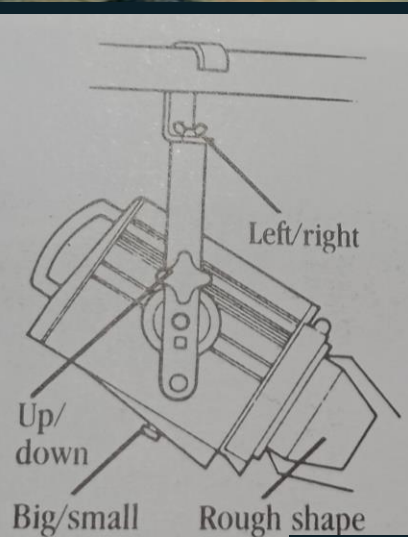
1000W 8~45deg PC Stage Spotlight,

PC or Fresnel?

Diffuser filters placed Infront of an instrument's lens smooth the light beam and soften its edge. By choice of appropriate strengths of diffusion, a PC spot can be softened progressively until the light quality is equivalent to a Fresnel. Consequently, the PC can be regarded as a rather more flexible instrument then the Fresnel. *(Reid, 2001)*



PC



Fresnel

When deciding between PC and Fresnel lighting, consider the specific needs of your production or project. Here are some key factors to evaluate:

1. Desired Lighting Effect

Choose PC lights for precise, focused lighting, while Fresnel lights are better suited for softer, more diffused lighting.

2. Application Environment

Consider the venue and type of performance. PC lights are excellent for smaller stages, while Fresnel lights are often preferred for larger venues requiring wash lighting.

3. Heat Output

If heat management is a concern, especially in enclosed spaces, opt for LED options in either category to reduce thermal output.

4. Budget

Budget constraints may also influence your choice. PC lights may be a more affordable option, while high-quality Fresnel lights can be a significant investment.

5. Control and Adjustability

Evaluate the control options available. If motorized zoom and remote control are essential, look for modern Fresnel models that incorporate these features.

(sourcifychina, 2025)



Types of Lighting Instruments:

Profile Spots:

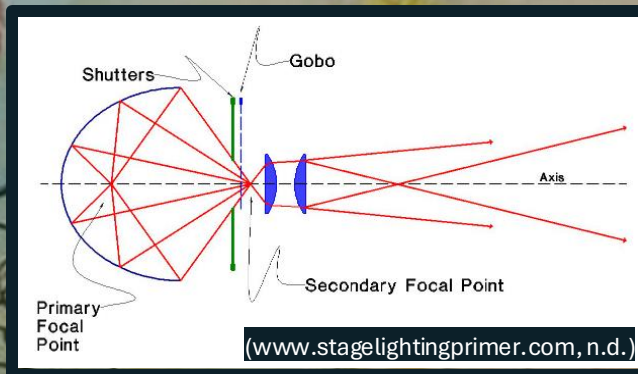
In a profile spot, the lamp and reflector remains stationary while the lens is movable (the opposite to Fresnel or focus spots) The lens movement in a profile spot controls the beam quality; the lenses are capable of producing a very hard precise edge which can gradually be softened by progressive movement of the lens tube. Size and shape of the beam is controlled by adjustments located at the central point of the optical system(the gate). All profiles have four shutters which can be used to make any size of four-sided shape. There is a slot with runners which accept either an iris diaphragm (gives full range of circular beam sizes) or a metal mask to produce any required beam shape.

(Reid, 2001)

Focusing Profiles:

When focusing a zoom profile, both the lenses are moved independently to determine both the size of the beam and the degree of sharpness at the edge on the beam. Most profiles have a field adjuster at the back of the lantern which allows the lamp to be set for a bright-centre 'peaky' beam, or a flat, even-intensity beam. The profile's beam can be shaped by the shutters or made smaller by the introduction of the iris into the gate as previously stated.

(Palmer, 2006)



Gobos:

A patterned metal disk that can be placed in the gate of the profile to project an image onto the stage/scenery. Common types include window, trees, clouds, leaves ect. (Palmer, 2006)



Types of Lighting Instruments:

Par Can:

Has a soft-edged ellipsoidal beam. They were developed from aircraft landing lights for the music industry in the late 70s and it consists of a lamp, reflector and lens in a single 'seamed beam unit' (like a car headlight), which is positioned at the end of a metal tube (the can).

the beam angle depends on the lamp type and can be adjusted by fitting a different lamp unit. The beam size can't be changed by focusing. Focus is by panning and tilting and the lamp may be rotated but take note that use is limited. It is ideal for splashes of colour, strong shafts of light, colour washes, backlighting, music and variety shown. A parallel beam can be dramatically enhanced by smoke effects.

(Palmer, 2006)

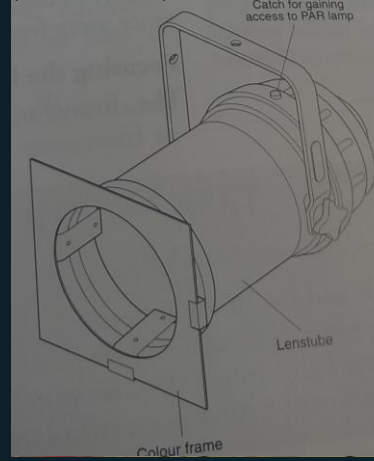


Birdies:

Mini lanterns of this type are known as 'Par 16 mini cans' or 'Birdies'. These are useful for when there is limited rigging space, such as inside a scenic piece or at the front of the stage. They run at 12 volts, and they must be wired to a transformer because of this, before being plugged into the electrical supply.

(Palmer, 2006)

(Palmer, 2006)



Lamps for the PAR 64 come in four forms:

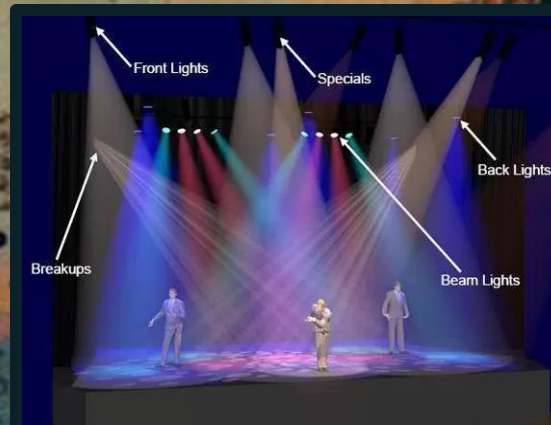
- ❖ Very Narrow Beam,
- ❖ Narrow Beam,
- ❖ Medium Flood,
- ❖ Wide Flood,

Despite their limitations, they are quite popular due to their low cost, simplicity and ease in its rigging setup. We have a multitude of them at UWTSD.

(Palmer, 2006)

Common Types:

- ❖ 500W PAR 56
- ❖ 1kW PAR 64



Beam-lights:

A similar type of lantern, but instead of containing a sealed beam unit, they use a conventional lamp and a parabolic reflector without a lens. This provides a very narrow & intense shaft of light, similar to a searchlight. The parallel beam has the same spread of light whatever the throw distance and is easily visible since it picks up airborne dust and moisture particles. Many beam-lights are fitted with spill rings at the front of the lantern which gives them a distinctive appearance. Beam-lights are relatively expensive but have recently regained popularity as follow-spots used closer to the stage than the conventional follow spot. Smaller beam-lights can also be used together in a batten, which is particularly effective in providing steep intense shafts of backlights.

(Palmer, 2006)

Par Lights vs Beam Lights:

Beam-lights

Unique Advantages:

- Precision: Their narrow beam allows for pinpoint **spotlighting**.
- Intensity: Even with their precision, they maintain a high light output.
- Effects: Beam Lights can create dynamic effects, especially when combined with fog or haze.
- Flexibility: They're often equipped with features like prisms or gobos, allowing for varied visual effects on stage.
- Beam Lights, with their specialized capabilities, have become invaluable tools for stage designers aiming for a more dramatic and impactful lighting setup.

(Guo, 2024)



Par Lights:

Known for their wide, flat beams, Par Lights generally cover a broader area. They're excellent for washing stages with color or providing ambient lighting.

Beam Lights:

These lights pack a punch with their intense brightness, concentrated into a narrow beam. This makes them great for spotlighting and highlighting specific elements on stage. (Guo, 2024)



Colors speak volumes. With Par Lights, you can bathe the stage in hues that reflect the mood of the scene, from the tranquility of blue to the passion of red. Beam Lights, meanwhile, can spotlight in vivid colors, drawing the eye and heightening emotions at pivotal moments.

(Guo, 2024)



Venue size:

Par Lights:

Best suited for venues of varied sizes, from intimate settings to medium-sized halls. Their wide beam allows for good coverage without overwhelming the space.

Beam Lights:

Ideal for larger venues or open-air concerts where the focus needs to be directed, especially when you want to highlight specific performers or stage areas.

(Guo, 2024)

Every stage production tells a story, and lighting is its silent narrator. The first step is understanding the tale you want to tell. Is it a warm, intimate dialogue or a cold, suspenseful confrontation? This understanding guides whether the soft wash of Par Lights or the sharp focus of Beam Lights will serve your narrative best.

(Guo, 2024)

Budget

Par Lights:

Generally, more affordable and are easier to set up, making them a cost-effective choice for events on a tighter budget.

Beam Lights:

Might come with a heftier price tag due to their advanced technology and features, but the investment can be justified by the unparalleled stage effects they can produce.

(Guo, 2024)

What Event?

Par Lights:

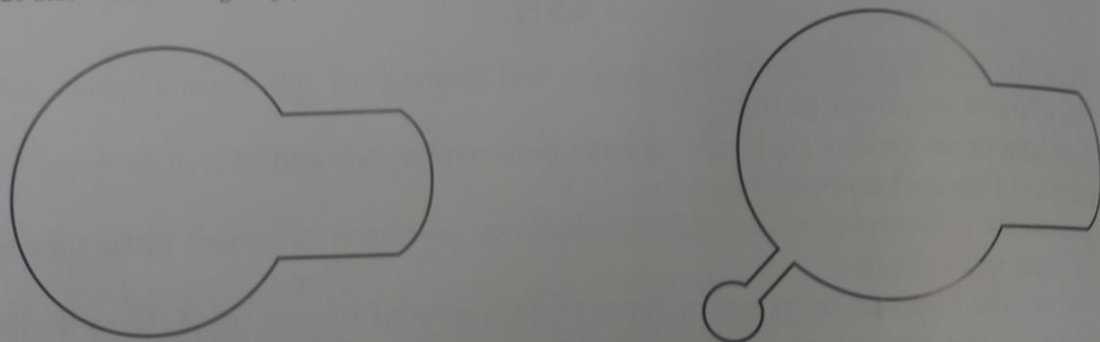
Perfect for theatrical productions, live bands, and events where mood setting is crucial. Their color versatility can create an array of atmospheres.

Beam Lights:

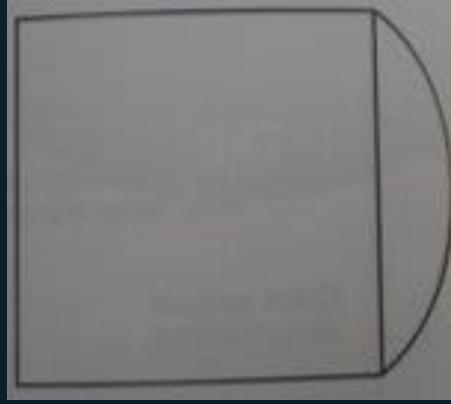
These shine in high-energy events like rock concerts, dance performances, and events where precise lighting changes are required in sync with the beats or performance pacing.

(Guo, 2024)

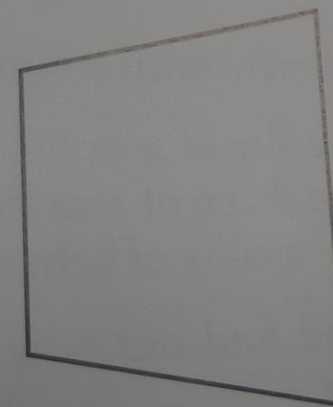
20 a&b Universal lighting symbol for a) a profile spotlight, b) a followspot



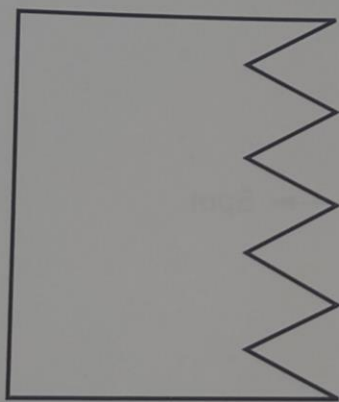
Universal lighting symbol for a PC



Universal lighting symbol for a floodlight

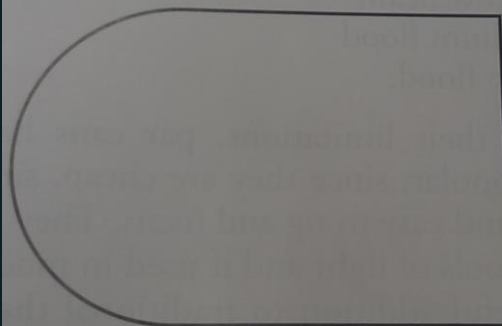


Universal lighting symbol for a fresnel spotlight

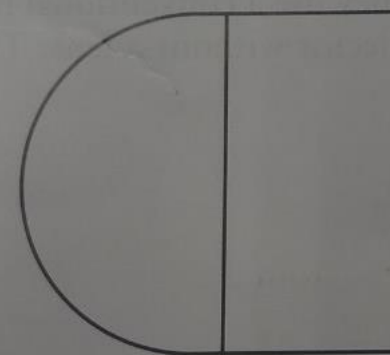


Universal lighting
symbols for the more
common lights.

14 Universal lighting symbol for a par can



Universal lighting symbol for a beamlight



(Palmer, 2006)

Types of Lighting Instruments:

Moving lights

Follow-spots:

The largest and most powerful profile lanterns. Usually positioned far from the stage, best effects achieved with a steep vertical lighting angle of between 30 and 60 degrees. They are known as 'limes' (limelight) and will be worked manually which makes it a demanding task. If done wrong, it will be incredibly obvious to the crowd. Because of the intensity of the light and the distance the light is projected, the smallest movement is magnified on stage.

The best technique is to aim the follow-spot at the target and then open the iris smoothly when light is needed. It is often used to cover the entire figure of the performer, so the feet and head need to be in frame constantly.

Follow-spots can also be used in less obvious ways to provide subtle highlights in dramatic productions. (Palmer, 2006)

The development of intelligent moving lights had direct implications for control systems. These now need to have the ability to operate a whole range of functions. Control over a single intelligent lantern can take up numerous faders on a standard, DMX512 compatible control board.

Some intelligent lights use an internal colour wheel to switch and mix colour. More sophisticated luminaires employ a dichroic colour system, which allows the light to be coloured in hundreds of different hues and to blend the colour changes live. (Palmer, 2006)

Intelligent Lights:

These were developed almost exclusively by the rock industry, moving lights have allowed an increasingly spectacular lighting. There are two main types:

- Moving Mirror,
- Moving Yoke.

(Palmer, 2006)

In the moving mirror type the lantern fixture remains static and the light beam is moved by mirrors.

Examples are:

- ❖ Cameleon Telescan Range (1)
- ❖ Clay Paky Golden Scan Range (2)
- ❖ Martin Professional Roboscan Range (3)
- ❖ High End Systems Technobeam Range (4)

<https://youtu.be/W2QBwMCphM8?si=3b9sCqfc3KkLHGNg>
-Cameleon Telescan MK2 (1)

<https://youtu.be/Wu9lmBkRHU?si=9QEJ5CewzcoXPRB>
-Cameleon Telescan MK2 (2)

With the moving yoke fixtures the motors allow the entire luminaire to pan and tilt. Examples are:

- ❖ Vari*lites,
- ❖ High End Systems Studio range,
- ❖ Clay Paky Stage Light series,
- ❖ Martin Professional MAC series,
- ❖ Strand PALS and Pirouette systems.



Stage Zoom
1200 by
Clay Paky



MAC One | Martin Lighting

There are numerous concerns which have prevented intelligent lights from being widely adopted for theatre use:

- Cost,
- Technological Concerns-(Complex units that require regular servicing and dedicated lighting control desks.
- Practical Concerns-(Most are heavy and noisy and can cause noise which can be heard by the audience if close by)
- Aesthetic Concerns-(The intense light generated by the lamps are perfect for creating powerful beams of saturated colour which not every performance/production requires)

(Palmer, 2006)

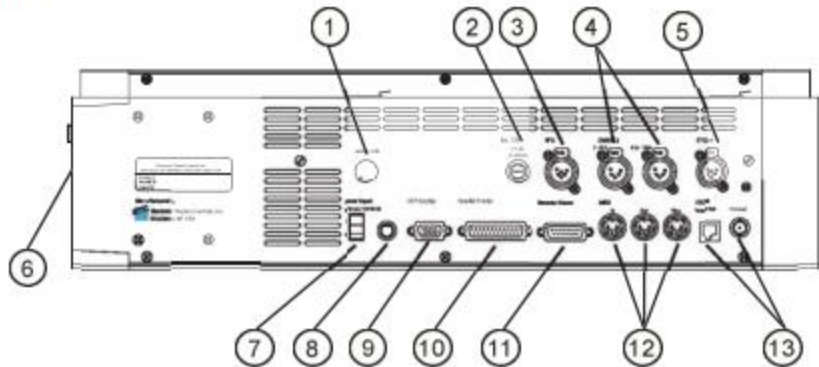
However, it was perfect for my lighting design project.

Control Boards:

The lighting control, “board” or “desk” is a key part of any stage lighting set up, and it is using the lighting desk that an operator is able to control the equipment. This can range from adjusting the “levels” on stage lighting dimmers to controlling complex intelligent lighting systems and media servers. Although there are many different types of lighting control, a great deal of the features are common to most. (Sayer, 2007)

The initial information that we need to collect is in regard to the lighting fixtures that are connected to the system. The feature set needed in a console is directly dependent on what needs to be controlled or will need to be controlled if there are plans to upgrade the lighting in the future. We also need to pay close attention to the quantity of fixtures the system has or will have and the number of DMX channels they require in total. If the lighting is completely dimmer-based, or single intensity parameter LED, then we can look at a very basic dimming controller, or perhaps a two-scene preset console. These come in various sizes and capabilities but are usually limited on the maximum number of DMX channels they can control, typically around 48. Some allow for recording of presets, or cues for show playback, while others do not. (Pridmore, 2025)

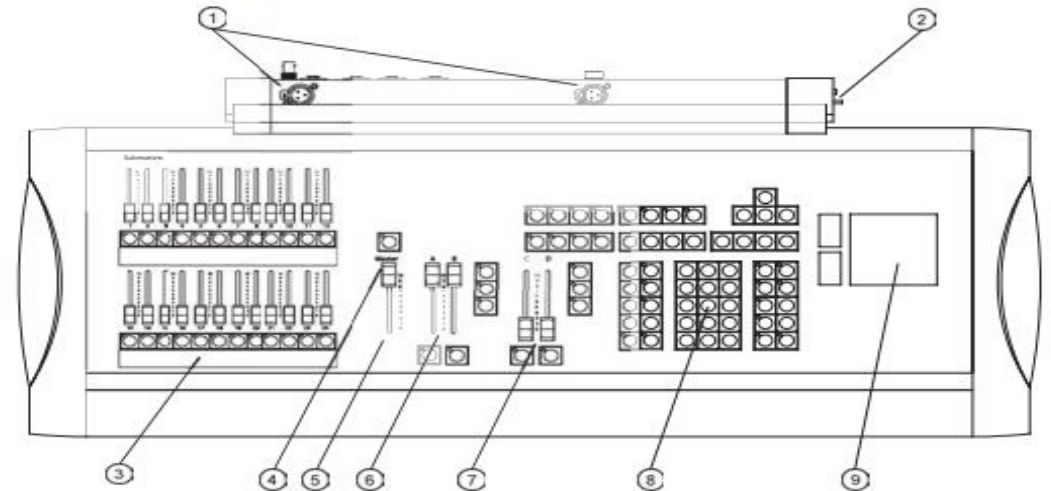
Back panel



- | | |
|-----------------------------|--|
| 1. Desk Light Dimmer | 8. Power input connector |
| 2. RFU fuse (T2.5A) | 9. Command Display output |
| 3. RFU | 10. Parallel Printer |
| 4. DMX512 Out (2 universes) | 11. Remote Macros |
| 5. ETCLink | 12. MIDI In/Out/Thru |
| 6. Disk Drive (side) | 13. ETCNet (newer facepanels do not have Thin-net connector) |
| 7. Power switch | |

(Lighting Control Console Quick Guide, 2002)

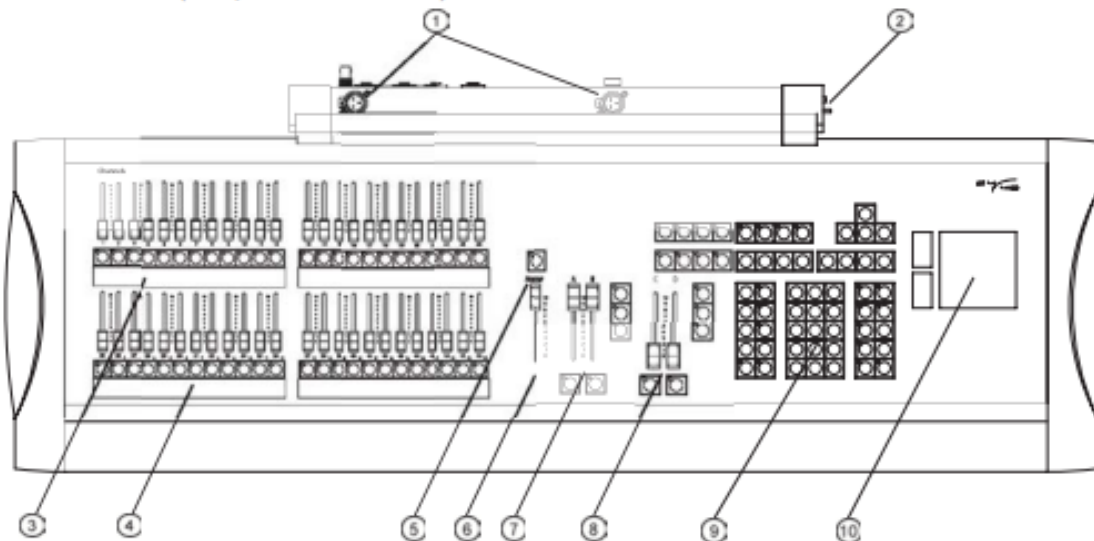
Face Panel (Express 125/250)



- | | |
|--------------------------|------------------|
| 1. Desk Light connectors | 6. AB Fader pair |
| 2. Disk Drive (side) | 7. CD Fader pair |
| 3. Submaster faders | 8. Keypad |
| 4. Blackout key | 9. Trackpad |
| 5. Grandmaster | |

(Lighting Control Console Quick Guide, 2002)

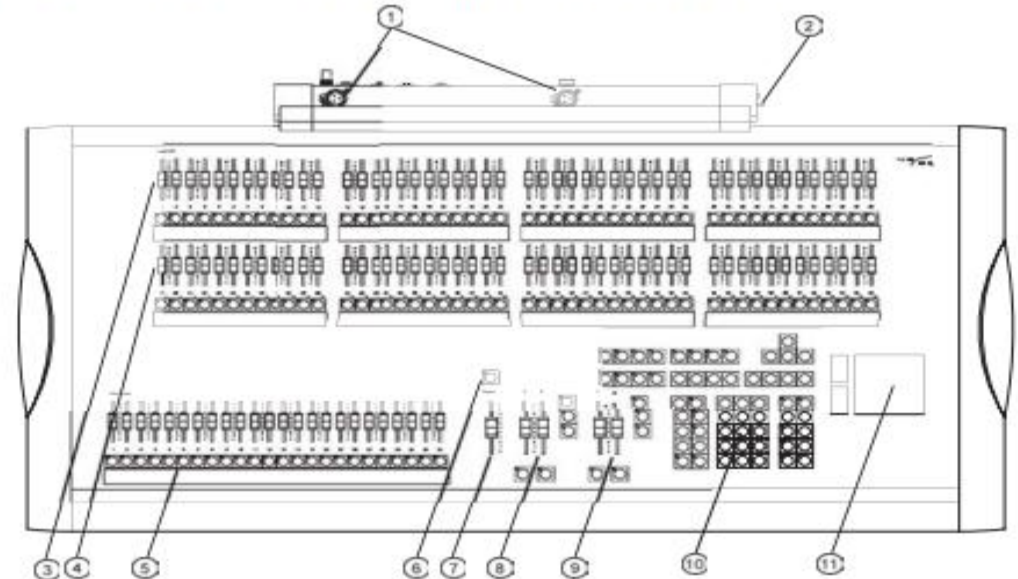
Face Panel (Express 24/48)



- | | |
|---------------------------------------|------------------|
| 1. Desk Light connectors | 6. Grandmaster |
| 2. Disk Drive (side) | 7. AB Fader pair |
| 3. Channel faders (Scene A) | 8. CD Fader pair |
| 4. Channel/Submaster faders (Scene B) | 9. Keypad |
| 5. Blackout key | 10. Trackpad |

(Lighting Control Console Quick Guide, 2002)

Face Panel (Express 48/96, Express 72/144 is similar)



- | | |
|-----------------------------|------------------|
| 1. Desk Light connectors | 7. Grandmaster |
| 2. Disk Drive (side) | 8. AB Fader pair |
| 3. Channel faders (Scene A) | 9. CD Fader pair |
| 4. Channel faders (Scene B) | 10. Keypad |
| 5. Submaster faders | 11. Trackpad |
| 6. Blackout key | |

(Lighting Control Console Quick Guide, 2002)

5-Pin XLR (DMX)



Usually used for sending DMX-512 from a lighting console to daisy-chain of lighting instruments. 512 means that each 5-pin cable can control up to 512 parameters. For example, 512 conventional dimmers, or 32 LED fixtures that require 16 channels of control each.

Cables and Connectors:

4-Pin XLR



Used for powering and controlling lighting accessories like gobo rotators and color scrollers.

9-pin Socapex



Used for carrying multiple circuits of power, often broken out to individual lighting instruments

7-pin Socapex



Used on some chain hoists and automation equipment where one cable supplies both control signal and power.

Stage-Pin



3 conductors. Used for connecting conventional lighting instruments to dimmers. Can also be referred to Grounded Stage Pin (GSP).

L5-15

3 conductors with a twist lock connector. Suitable for 15-amp service. Sometimes found on moving lights, small dimmer packs, or other distribution.



NEMA L5-15 Male Plug



NEMA L5-15 Female Connector



Black Cord



Rigging:

The horizontal scaffold tubes or trusses that are hung over the stage are known as **bars**. Lighting bars over the stage are numbered from the proscenium arch towards upstage. The bar closest to the proscenium is LX1 (or Electrics 1 or Number 1 Electric in the USA). The numbers increase for the full-stage width lighting bars going upstage. Other positions are named after their location.

Overhead horizontal lighting bars are the most common lighting position in any type of theatre.

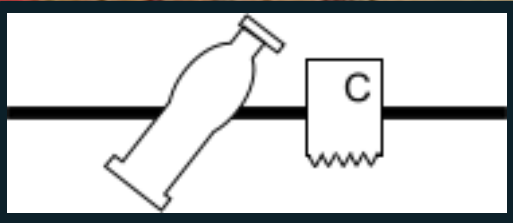
Most theatre spaces have scaffold bars (48mm diameter) to rig lanterns from.

If the bars are equipped with sockets, they are internally-wired bars (often abbreviated to IWBs) which use the bar to carry the wiring to the sockets.

On a lighting plan, the lanterns are shown with the bar drawn 'underneath' them as shown right.

Lanterns are rigged onto bars using clamps - either a Hook Clamp or a Half Clamp can be used. (C Clamps are used in the USA). In combination with an M10 bolt and wing nut, any lantern can be rigged easily. A safety wire is also needed to hold the lantern in the air if the primary support (clamp) should fail.

(Theatrecrefts.com, 2018)



Side-Stage

Vertically-mounted bars are called Booms and enable lighting equipment to be rigged close to the stage floor, lighting across the stage. They can also be mounted above one another for the length of the boom.

Booms are named by their position (e.g., SR Boom #1 is the downstage boom on stage right (the left of the stage from the audiences' point of view)).

Front of House

Bars just downstage of the proscenium at high level are known as Advance bars.

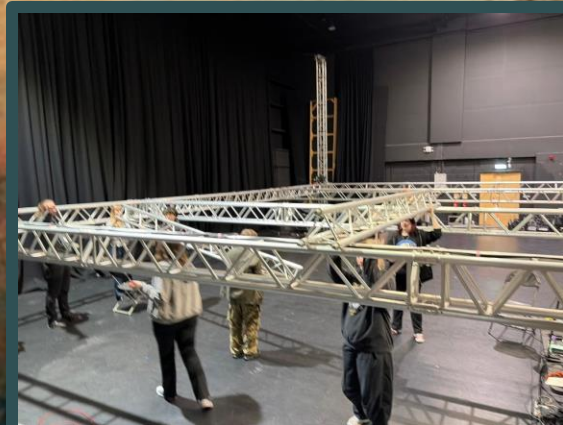
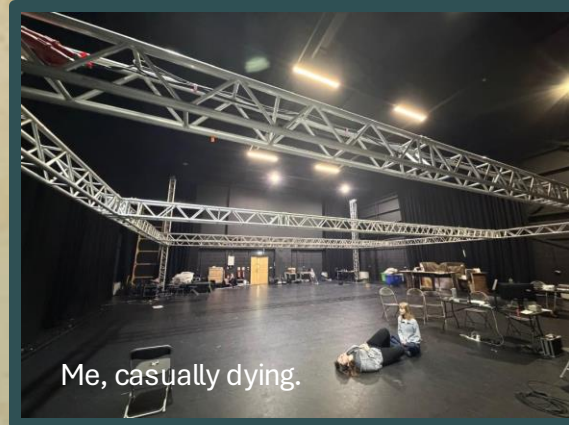
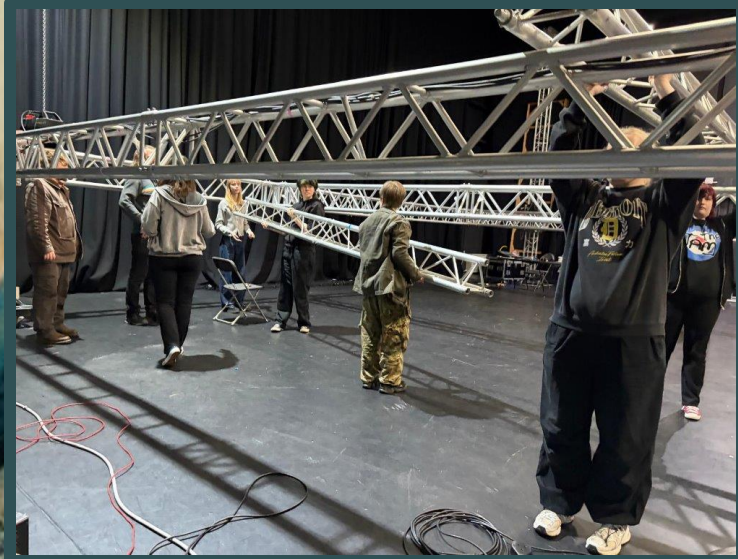
Rigging positions are then named after their location.

Balcony Bar is on the front of the main Balcony seating area. Box Booms are beside the auditorium seating boxes. Circle Bar is on the Circle. etc.

(Theatrecrefts.com, 2018)

Our De-Rigging Sessions

This was our de-rigging session after our lighting project.



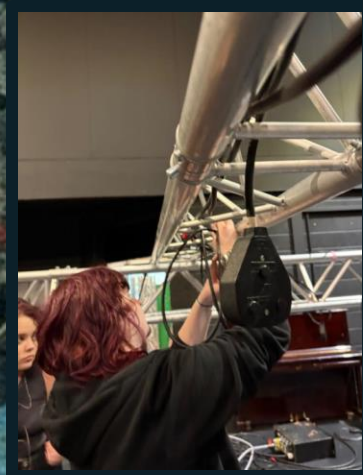
Our Rigging Sessions



This one was fun; we had to set up the lighting for the skills competition. It involved a lot of extension wires, and it took a few bits of trial and error to get all the lanterns set up. It was simple to hang and secure them though. All the barn doors were opened now instead of waiting until they were raised once more out of our reach. The wires were wrapped around the rigging bars, nice and neat. Once the lighting desk was connected up, we needed to test the lanterns had working bulbs and what number they were on the channels.



Once it was all set up and checked, we broke out the ladders to direct the light to the red tape marks in the centre of the room. A few of us stood on the marks as the lights need to show the person not the ground.



The home of lanterns that we ransacked for this setup.



Various Other Performance Types:

TV and Film Productions

Lighting for TV and film requires precise control to ensure consistency and quality. Techniques such as three-point lighting are commonly used to achieve professional results. In three-point lighting, the key light provides the main source of illumination, the fill light softens shadows created by the key light, and the backlight separates the subject from the background, creating depth and dimension.

Consistent lighting is crucial for maintaining the visual quality of the production, as variations in lighting can be distracting to viewers. Additional techniques, such as using soft boxes or reflectors, can help diffuse light and create a more flattering appearance for subjects. Color temperature is also an important consideration, as it affects the overall look and feel of the footage. Properly calibrated lighting ensures that the colors appear natural and consistent across different scenes and shots.

(Woo, 2024)



Concerts and Live Music

Concert lighting is dynamic and colorful, designed to match the energy of the music and enhance the audience's experience. It often includes moving lights, strobes, and laser effects that create an electrifying atmosphere. These lighting elements can be synchronized with the music to highlight beats, create visual rhythms, and amplify the overall impact of the performance.

Moving lights can sweep across the crowd or stage, while strobes can add a pulsating effect that matches the tempo of the music. Laser effects can project intricate patterns and shapes, transforming the venue into a vibrant and immersive environment. Effective concert lighting not only highlights the performers but also engages the audience, making the experience memorable and captivating.

(Woo, 2024)

Dance Shows

Dance lighting is crucial for highlighting movement and creating visual depth on stage. Side lighting is often used to emphasize the dancers' shapes and motions, casting dramatic shadows that accentuate their movements. This type of lighting can make the dancers appear more three-dimensional, enhancing the fluidity and grace of their performance.

In addition to side lighting, color washes and spotlights can be used to focus attention on soloists or specific dance sequences. The interplay of light and shadow can add an extra layer of emotion and drama to the choreography, making the performance visually stunning and emotionally resonant. Dance lighting should be carefully coordinated with the choreography to ensure that it complements and enhances the dancers' movements.

(Woo, 2024)



The process of lighting design

(Palmer, 2006)

Initial brief/starting point

Creative design process

Technical planning and
organisation of equipment

Final lighting plan

Rigging

Focusing

Performances

Technical Rehearsal

Plotting

Post-production strike and
return equipment



Post-production strike and
return equipment

Initial Brief:

The lighting design brief is usually acquired through detailed discussion with the Director or members of the design team. A style and period for the production will be established, as well as the role and function of the lighting.

Technical planning and organisations:

This involves the translation of the conceptual response to the script in terms of light, to a lighting plan and other accompanying documentation that can be understood by members of the electrics team.

Technical rehearsal:

This is the run through of the performance with the cast and with all the technical cues in place. This is the time for the Lighting Designer to check on timing, light levels, colour, positioning of cues and whether the previously plotted cues are technically feasible in performance. Minor changes are often made at this stage.

Creative design process:

There is a period when design ideas are developed through emersion in the project, attending rehearsals, research and further discussions with the directors and design team. Experimentation with ideas will occur both on paper and in practice.

Focusing:

The orientation and beam characteristics of each lantern are set. In addition to the precise positioning of each lantern in relation to the stage, the beam may alter in size, shape, texture or colour.

Plotting:

The lighting is created by setting the level of intensity of each lantern to build up individual stage pictures of light (lighting states). Each state is then plotted (recorded precisely) in order to accurately during the performances.

Rigging:

The process of placing every lantern in a rig, according to the lighting plan. This process occurs as part of the fit-up of a production. Each lantern is plugged into a dimmer to create a circuit.

Dress rehearsal:

This is a complete run through. It doesn't stop until curtain. This run through is under performance conditions and gives the first uninterrupted view of the lighting. Fade times, intensity and visual impact of the lighting on the stage are all monitored.

Post-Production:

After the show, all equipment is derigged and hired equipment is returned in the same condition. The lighting team may be involved in post-production evaluations.

Performance:

Lighting should be replayed exactly as it has been plotted. Freelance lighting designers aren't needed after opening night and often leave to begin another job elsewhere.



Lighting Production Team:

Lighting Designer (LD)

The Lighting Designer is responsible for the lighting design, the configuration of lighting equipment and the creation of lighting (cues). On a bigger show, they may also be responsible for putting together the team of people who realise the lighting design - production electrician, programmer, specialist technicians, follow spot operators etc. On smaller shows however the LD is often expected to do multiple roles such as; rigging the equipment and programming cues into the lighting desk. They don't just find work in theatre. Live concert touring, events, commercial product launches and conferences all make use of designed lighting and will provide work for lighting designers and all the people who work with them.

Typically, LDs need to have 'craft knowledge' of how the lighting equipment they use works. Expected to have ideas in light, the rig plan that will make it possible to make those ideas real, to focus all the instruments, create all the cue states and communicate the way they should be played back each show, and stay reasonably sane. To do this work consistently well requires knowledge, talent and experience.

(The Association for Lighting Production and Design, 2015)

Production Electrician and Touring Chief LX

Typically, these are the people in charge of setting up and maintaining the lighting rig and all the associated equipment. They work on the larger shows, theatre of all kinds, concert touring and all the rest. They usually work very closely with the lighting designer, and on largest productions may lead a big team. They look after the show for the LD, who may not come to every performance or date of the tour. Touring a lighting rig means designing the system, so that it can quickly be packed away in trucks, move, and set up somewhere new, sometimes every day. The touring staff stay with the show. On some productions they may travel all over the world, though on a busy tour the tour staff may not get to see much more than the inside of the venue.

(The Association for Lighting Production and Design, 2015)

Freelancing

Lighting Designers, Production Electricians, Touring Chiefs and Programmers are almost always freelance practitioners, running themselves as an independent business.

(The Association for Lighting Production and Design, 2015)

Lighting Programmers

Programmers are really only required on larger shows, and like the Production Electrician and Touring Chief LX they will work closely with the LD. It's largely the programmer's job to make the lighting rig do what it needs to do so that the LD's ideas can be brought to life. Programmers need to have good computer skills, a logical approach, and a good eye. They need to be able to see the stage in the same way the LD does. Most programmers start as lighting technicians, then become show operators gradually developing the skills of programming.

(The Association for Lighting Production and Design, 2015)

Theatre or Venue Chief LX and Head of Lighting

These job titles can describe a number of different levels of responsibility. In some cases, the Chief LX is little more than the head maintenance person, looking after the infrastructure of a building and having very little to do with actual shows. However, in many more cases these are the men and women who really make it worth working in a particular venue – for the visiting LD and for the crew. They will usually have held a number of positions on the way to these responsible jobs – perhaps in the same or different theatres or perhaps “on the road” – touring. In the largest theatres and opera houses the Head of Lighting will be a very senior role, responsible for the quality of lighting on one or more stages and perhaps on the companies touring productions too, working with international lighting designers, and ensuring their in-house and hired equipment is the best it can be.

This kind of responsibility is not really found in concert venues, as most visiting acts will come with their own lighting team.

(The Association for Lighting Production and Design, 2015)

Our Lighting Project:

Our brief:

'Each student should select a short speech to be performed and then design the lighting for that performance. As part of the week's training, you will receive guidance and support to help develop your ideas and design. The performances and designs will be presented on Friday the 23rd Jan between 10am and 4pm.'

Some pointers:

Choosing a speech:

It can be from a play/film or a poem or song lyrics. The words will be read not sung. Whichever it is, it should take between 1-3 minutes to recite.

Designing the Lighting:

Don't worry, this is not an exercise in electrical engineering! Once you have selected your speech, think about how it would look when it is performed. How would/could the lighting be used to enhance the mood of the speech? Where might lighting changes (cues) go? How might colour add to the overall presentation?...will it? How does your lighting design help tell the story?

As a guide, aim for no more than 5 lighting cues...(it may be only two or three) You will have a tight schedule to create this!

How it will work:

On the day of the presentations, the group will be split into teams. Within each group each individual will take turns to present their design. The other members of the group will support them as; Performer, DSM and Board Operator/Technician. So not only will you have to present your work, but you'll also work on the other presentations in your group.

My idea:

I wanted to design the lighting for a speech done by Heath Ledger, the iconic actor who (in my opinion) had the best portrayal of The Joker. He makes an appearance in 2008 in '*The Dark Knight*'. Unfortunately, the "Why so serious" ICONIC speech was too short to meet the minimum time requirement. This meant I had to choose another. I chose the scene where

The Joker sneaks into the hospital to talk to Two-Face one on one.

<https://www.youtube.com/watch?v=ylwMWpbv5Fk> (Youtube.com, 2026).

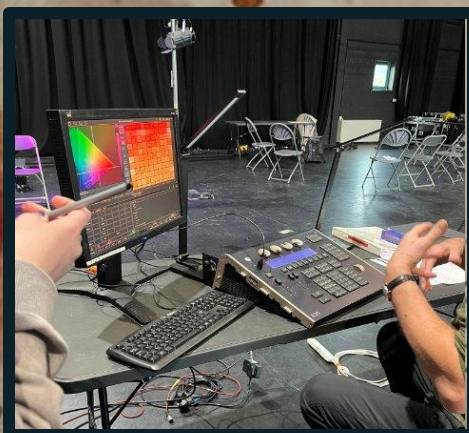
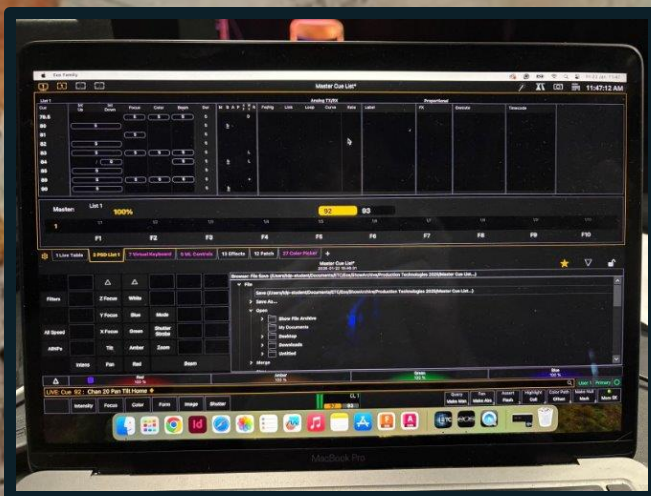
It begins at 40 seconds in, and I cut it off at 3:15 as I needed to skip the other parts of the movie that weren't relevant here.

His speech dissolves into the topic of anarchy and I wanted to reflect this in my lighting. Felix was so gracious as to be my actor. His green hair really did fit my theme, and his hair has the volume I was looking at for the lights to bounce off and pass through. His hair does come down quite far on his forehead, which made it easy for me to set the shadow on his eyes. I do believe this will fit as it creates a mysterious atmosphere for the audience. It is supposed to convey a creepy visual in honour of how Heath Ledger portrays his character.

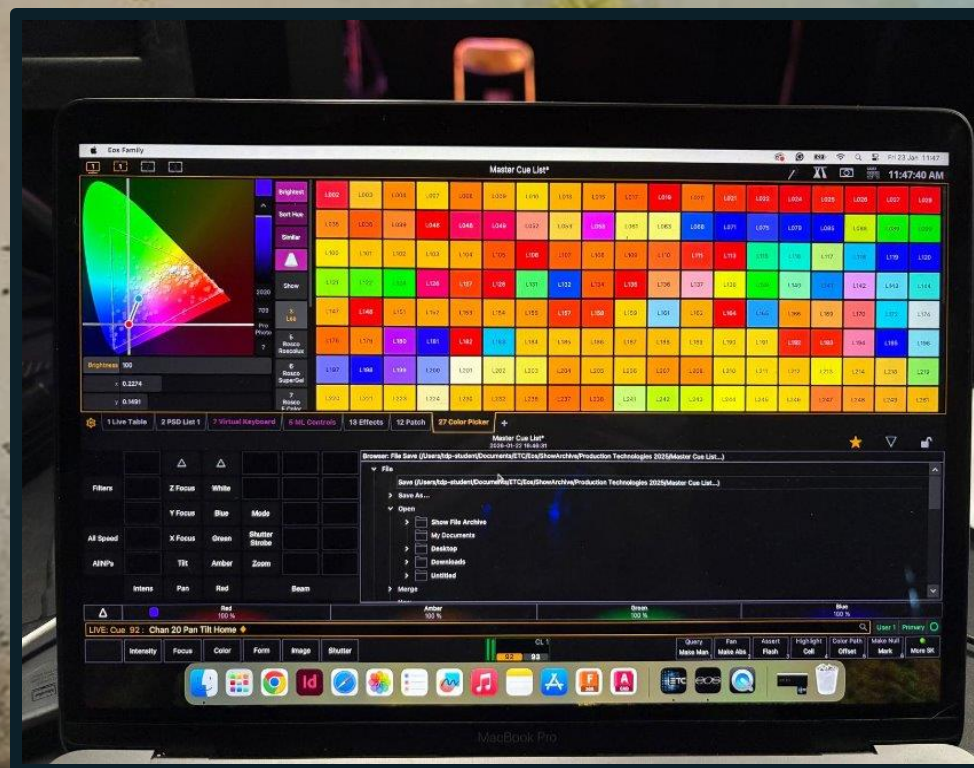
My vision/inspiration:

I wanted to use the typical joker colours, green and purple. The movie takes place in Gotham, a large city. One thing I typically associate with large cities is the public transport. The most chaotic one? In my opinion it's the underground train station. It is played up in movies, flashing lights, loud noises as it speeds through. Putting this together with the green and purple, the type of green you would see on emergency lights or neon signs. I wanted it to follow a neon 'cyberpunk' style. My moodboard will be quite chaotic as I want it to represent the insanity that dwells within The Joker's twisted mind.

Messing around with the lighting board.



This was the desk we were trying to learn on before it died, and we had to switch to the laptop program.



Character knowledge:

Focusing on Christopher Nolan's adaptation. This is partly because of the near perfect performance the late Heath Ledger brought to the crime Prince of Gotham and because I feel that Christopher and Jonathan Nolan's writing really brought out the best (or worst,) of the Joker psychologically, creating a thought-provoking personality in the process.

Character Analysis

In *The Dark Knight* (2008), Heath Ledger's Joker embodies and intensifies the villain's philosophies of anarchy. Like other portrayals of the Joker, Ledger's is homicidal, hostile, and unhinged. This Joker, however, is hyper-focused on the destruction of a civil society. He is driven by the symbology of disorder, the *ideology* of chaos; not so much the process or the exactness of getting there.

(Letamendi, 2019)

He is a moral philosopher, a provocateur, and an empiricist. In fact, he is motivated to prove that the elimination of the state will result in a freer, fairer society. This non-recognition of order makes Ledger's portrayal more frightening than other Joker characterizations.

(Letamendi, 2019)

The Joker's Origin:

When fans first met the Joker in 1940's *Batman #1*, his true origin was a mystery. From his first confrontation with Batman, he was already fully formed, a grim comedian with no past, no civilian identity, who deals in death with every punchline.

As a clown, the Joker is always changing up his routine in severity, delivery and persona. His only consistent feature over all these years has been his pathological obsession with Batman—two sides of an ideological coin minted with chaos and order. The difference is that we've always known Bruce Wayne's story.

(Jaffe, 2024)

Ask the Joker himself and he'll give you a different account every time. In *Batman: Mad Love*, the Joker first captured Dr. Quinzel's heart with a tragic story of his one happy memory of being taken to the circus by an abusive father. In that same comic, Batman told Harley that the Joker gave him a different story about ice skating. In 2010's *The Brave and the Bold #31*, the Atom enters Joker's mind and witnesses the youth of a disturbed child who sets his boarding school ablaze. DC Black Label's *Joker/Harley: Criminal Sanity* paints the Joker as a vigilante serial killer who targets abusive parents, radicalized only by the appearance of Batman. There's the sob story of his horrible Aunt Eunice that Joker provides in 2013's *Batman #23.1*, the hopeless romantic of *Batman Confidential's* "Lovers and Madmen," and the poor young victim subjected to a virus that poisons his mind in *Batman: Streets of Gotham's* "The House of Hush." Catch him in a certain mood, and he'll conjure up a new one for you about how he got these scars.

The most famous quote about the Joker's origins comes from *The Killing Joke*: "If I'm going to have a past," the Joker says, "I prefer it to be multiple choice!" *Batman: Endgame* shows us that swapping stories of the Joker's true origins is a favorite dark pastime of Gotham citizens themselves. Geoff Johns and Jason Fabok's *Batman: Three Jokers* expands on this idea by suggesting that there's not just room for multiple answers, but multiple *correct* ones.

(Jaffe, 2024)

"YOU SEE, THEIR MORALS, THEIR CODE, IT'S A BAD JOKE. DROPPED AT THE FIRST SIGN OF TROUBLE. THEY'RE ONLY AS GOOD AS THE WORLD ALLOWS THEM TO BE. I'LL SHOW YOU. WHEN THE CHIPS ARE DOWN, THESE... THESE CIVILIZED PEOPLE, THEY'LL EAT EACH OTHER. SEE, I'M NOT A MONSTER. I'M JUST AHEAD OF THE CURVE." - JOKER



"I DON'T, I DON'T WANT TO KILL YOU! WHAT WOULD I DO WITHOUT YOU? GO BACK TO RIPPING OFF MOB DEALERS? NO, NO, NO! NO. YOU... YOU... COMPLETE ME." - JOKER



The Speech:

"Do I really look like a guy with a plan? You know what I am? I'm a dog chasing cars. I wouldn't know what to do with one if I caught it.

You know, I just... do things. The mob has plans; the cops have plans; Gordon's got plans. You know, they're schemers. Schemers trying to control their little worlds. I'm not a schemers . I try to show the schemers how pathetic their attempts to control things really are. So, when I say..... ah, come here.

When I say that you and your girlfriend were nothing personal, you know that I'm telling the truth. It's the schemers that put you where you are. You were a schemer; you had plans and look where that got you.

I just did what I do best. I took your little plan, and I turned it on itself. Look what I did to this city with a few drums of gas and a couple of bullets. Hmmmm? You know..... you know what I've noticed? Nobody panics when things go 'according to plan'. Even if the plan is horrifying! If, tomorrow, I tell the press that, like, a gang banger will get shot, or a truckload of soldiers will be blown up, nobody panics, because it's all 'part of the plan'. But when I say that one little old mayor will die, well then everyone loses their minds!

Introduce a little anarchy. Upset the established order, and everything becomes chaos. I'm an agent of chaos. Oh, and you know the thing about chaos?

It's fair."



*My single
inspiration picture
as per
Rox's request.*



My cue wants:

First draft:

Cue numbers 71 upwards.

- 71- Begin with subtle shades of green (colour L219) mostly orange lights/ naturalish lighting
- 72- Lights change. The addition of more green(New colour L090)and introduce purple(Colour L707). Orange changes from behind and is now above, helps cast shadow on Felix's eyes.
- 73- Orange light is to be removed; more shadow on the face.
- 74- green light begins to move
- 75- Green light begins flashing, resembles chaos/anarchy.
- 76- Green and purple fade out, one orange light on the face to cast shadow up behind felix.
- Fades to black.

I didn't like the look of the moving light, so I removed 74 and renumbered it. Making it cue 71-75.

Our Lighting Project:

Final Draft:

Cue number 71 upwards.

- 71- Begin with subtle shades of green (colour L219) mostly orange lights/ naturalish lighting. The green light comes from lantern 23. The orange from number 2.
- 72- Lights change. The addition of a more sickly/neon green(New colour L090) and introduce purple(Colour L707), lantern number 21. Orange stays on 2 but fades down slightly, helps keep shadow on Felix's eyes.
- 73-Green changes from 23 and now comes straight from above, from 20, same shade.
- 74-Green light begins flashing, resembles chaos/anarchy.
- 75-Green fades out, one orange light on the face from light 4 on the ground to cast shadow up behind Felix. The shadow is to represent chaos as a separate entity, one that looms over people, one that isn't visible to the person hence why I placed it behind Felix.

Cue 71:

Channel 23@ Full intensity, Channel 23 @Colour L291.
Channel 1@ 7 intensity.

Cue 72:

Channel 23@ Full intensity
Channel 23@ Colour L090
Channel 21@ 6 Intensity
Channel 21@ Colour L707
Channel 1@ 5 Intensity

Cue 73:

Channel 23@ 0 Intensity
Channel 20@ Full Intensity
Channel 20@ Colour L707
Channel 21@ Full Intensity

Cue 74:

Channel 20@ 6 Focus

Cue 75:

Channel 1@ 0 Intensity
Channel 4@ Full Intensity
Channel 20 @ 0 Intensity

Fade out.

Cues and directions in my script:

-Cue start

-Stage Directions

Cue 71

"Do I really look like a guy with a plan? You know what I am? I'm a dog chasing cars. I wouldn't know what to do with one if I caught it. You know, I just... do things. The mob has plans; the cops have plans; Gordon's got plans. You know, they're schemers. Schemers trying to control their little worlds. I'm not a schemers. I try to show the schemers how pathetic their attempts to control things really are. So, when I say.... ah, come here.

Cue 72

When I say that you and your girlfriend were nothing personal, you know that I'm telling the truth. It's the schemers that put you where you are. You were a schemer; you had plans and look where that got you.

Cue 73

Sit forward in chair, elbows on knees. Speech starts getting louder.

Number 74 cue.

Cue 75

I just did what I do best. I took your little plan, and I turned it on itself. Look what I did to this city with a few drums of gas and a couple of bullets. Hmmmm? You know..... you know what I've noticed? Nobody panics when things go 'according to plan'. Even if the plan is horrifying! If, tomorrow, I tell the press that, like, a gang banger will get shot, or a truckload of soldiers will be blown up, nobody panics, because it's all 'part of the plan'. But when I say that one little old mayor will die, well then everyone loses their minds!

Introduce a little anarchy. Upset the established order, and everything becomes chaos. I'm an agent of chaos. Oh, and you know the thing about chaos?

It's fair."

Wait for dark to say final words.

Spread out hands.

Faster speech, more crazed.

Exit cues, fade to black.

PROGRESS PICTURES:



IGNORE HOW
SHAKY MY
HAND IS.



I preferred the colours in this take. They were sharper and explored in a wider variety of purple and green shades but there is too much of the front light. This brightens up Felix too much.

'With the light on, it's less dangerous! Here we are now entertain us!'
I am aware it's not really the right lyric, but it's stuck in my head now so.....

Felix, hard at work.

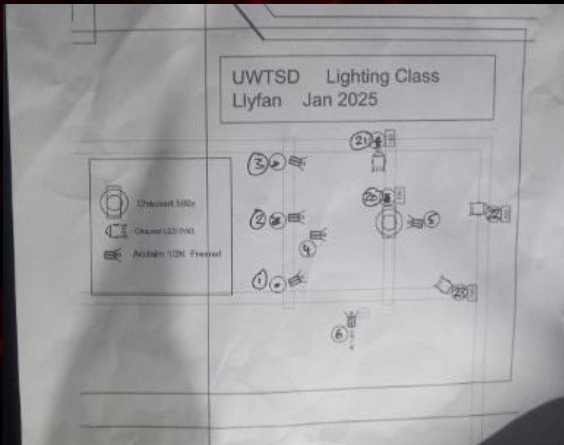


Joker Felix!

My camera is horrendous so please excuse the blur.



As I said I preferred the other as it was more vivid, but I did like that in this take I had a more defined third light from above on Felix's face. I felt it gave more of a shadow which added to the eeriness of the character portrayed.

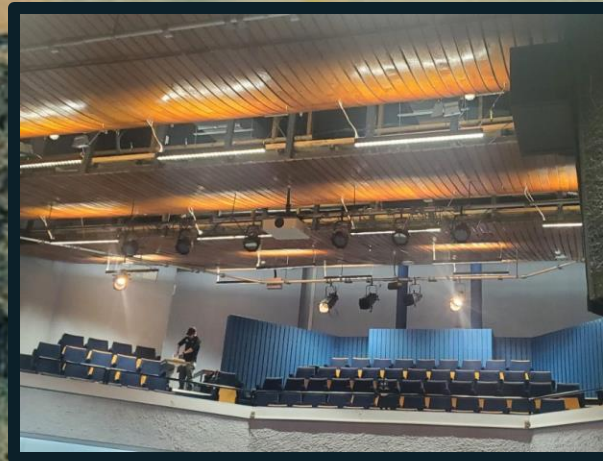
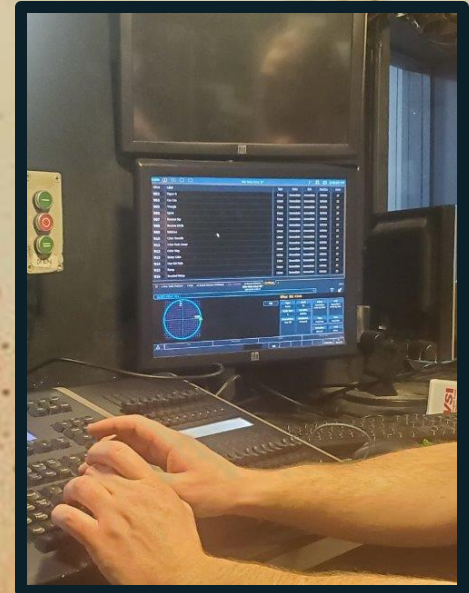


I say help as I didn't do a whole lot beside help carry and set up a platform as a makeshift desk for the sound crew. Those poles/legs were a nightmare. We needed to clear the first row of the seats and WHY ARE THE BOLTS SO LONG???? A pain to remove them but it worked .

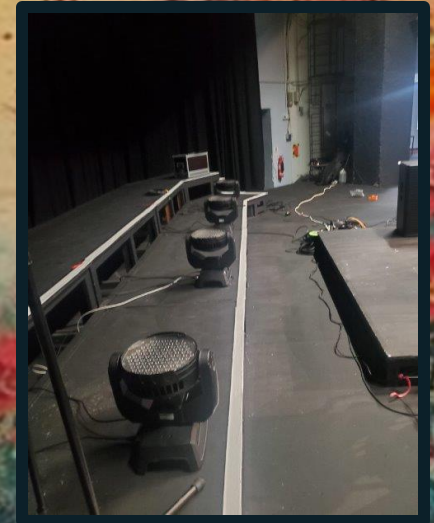
'Helping' Mei set up for the skills competition.



Mei also took Gilly and myself into the light and sound booth in the Halliwell theatre and showed us around that lighting desk. I used it to turn on and off the lanterns per Mei's request as he fixed the angle and such.



We did do a bit of unnecessary taping down the wires of the LED lights, but it was good practice.



Who is he?

Kenneth Posner

Kenneth Posner, Lighting Designer, designs on and off-Broadway, and for resident theatre and touring productions throughout both in the US and internationally. He began his career in the early 1990s as the lighting designer for the Berkshire Theatre Festival in Stockbridge Massachusetts. Selected Broadway credits include Beetlejuice, Mean Girls, Disgraced, Kinky Boots, Pippin, Cinderella, Hairspray, Dirty Rotten Scoundrels, The Coast Of Utopia – Shipwrecked, Other Desert Cities, The Merchant Of Venice, The Adventures Of Tom Sawyer, and Wicked. He is a graduate of SUNY at Purchase and is the recipient of the TONY, Drama Desk, Outer Critic's Circle and OBIE Awards.

(Studio School of Design, 2024)

An article about Posner:

"I discovered theatre at a young age, as a mechanism, frankly, to escape," Posner said. He was seven years old. His parents, who were immersing him in theatre, had just divorced. His mother created costumes for community stage groups in Westchester County, New York, where he grew up.

"She brought me and my brother along to the warmth and safety of these companies. I became involved in this world of storytelling, of creativity and expression. I never chose to leave it. I developed a passion for theatre, for telling stories in a proscenium arch."

That passion has led to 30 years in theatre, with 49 Broadway shows under his belt, along with many more Off-Broadway and on summer and regional stages. Posner, 47, has received ten Tony Award nominations for Lighting Design, including for Hairspray and Wicked—and an unprecedented three this year in the same category, for the musicals Pippin, Cinderella and Kinky Boots. He won in 2007 for Tom Stoppard's The Coast of Utopia.

(Rothstein, 2014)



Cont.....

Posner's fervor didn't initially focus on lighting. "I thought I might be a costume designer. In college I discovered light as an artistic medium, as a device to paint and sculpt with. I enjoyed the lighting designer's job of creating environments and mood. I completely pursued it."

He started working in summer theatre at the age of 17. "I've done summer stock every year since." He was at the Berkshire Theatre Festival in Massachusetts when two colleagues introduced him to Billy Mintzer, who taught lighting at Purchase College School of the Arts and who, Posner said, became "my mentor."

He had been studying lighting at Boston University and transferred to Purchase. "Mintzer presented lighting design from the point of view of a director, analyzing text — what is this about, why are we telling this story, how do you feel about the characters, the environment?"

At Berkshire, Posner encountered Gordon Edelstein, who had just become its associate director and who now heads Long Wharf Theatre. "We hit it off; he hired me to design three shows at Berkshire's second stage." He also met Michael Greif, who later directed Rent.

"I moved to New York. In 1990 Michael and I did a play, Machinal, at Naked Angels. Joseph Papp saw it and moved the entire production to LuEsther Hall at his Public Theater. That was my first big break."

The second came in 1996. Posner had worked Off-Broadway and in not-for-profit and regional theatre. Nicholas Martin, then at Playwrights Horizons, introduced him to Jack O'Brien, who was head of San Diego's Old Globe Theatre. O'Brien asked him to light Getting Away with Murder, a mystery by Stephen Sondheim and George Furth. It made the jump from the Old Globe to Broadway, under O'Brien's direction. "It didn't run long," Posner said — 29 previews, 17 regular performances. "But it was my first break in commercial theatre. The New York Times said some kind words about the lighting design. That's all it takes. That seed. Your name in the Times in a positive context can launch a young artist's career. It was magic." Posner's next Broadway musical — Tom Kitt and Brian Yorkey's If/Then, starring Idina Menzel— is due in 2014. "Someone once asked me, 'How long do you plan to be a lighting designer?'" Posner said. "It was a confusing question, because I get to work with great artists on great projects. I feel so lucky that I can walk into a theatre and tell someone's story and hopefully move someone or change someone's life or entertain someone. I want to do it forever."

(Rothstein, 2014)

Wicked:

Throughout, there are little flourishes that may or may not be projections. In “The Wizard and I” little magical spell patterns that appear on the floor (lighting, says McCarthy); then there are the images of flying monkeys on the proscenium during a sequences in which the Wizard's airborne simians escape their prison (projections, McCarthy notes). There is a giant Wicked Witch shadow at one point, as befits the designer who created similar effects for the recent revivals of *Into the Woods* and *Man of La Mancha*. But there are many more, almost subliminal, projection touches that fill out and expand the stage picture. The show drop, a map of Oz is highlighted by a green glow. When confetti is shot into auditorium, the effect is augmented by projected confetti; similarly, when Glinda makes her first, outrageous entrance in a giant bubble, projected bubbles appear around here. Still, this seamless blend of lighting and imagery didn't happen overnight.

(Barbour and Johnson, 2004)

“We dissected every moment,” says Posner. “It took three weeks to tech in San Francisco and three weeks again in New York. We re-examined every beat of the show — in all areas. The producers were very smart about that. That was always the plan — to have the out-of-town tryout, lay off for five weeks, then re-explore the material.” McCarthy adds, “Ken said something significant to me in New York when we started to tech. He said, ‘Elaine, this time around I want us to push what's already built into the Catalyst-let's work more with gobos and colors.’”

(Barbour and Johnson, 2004)

McCarthy uses Christie L8 projectors in *Wicked* — “they're my favorites,” she says. “They're quiet and fairly compact, and they have four lamps, which eliminates the needs for a backup projector. The L8s don't have a mechanical dowsers, which was a problem in San Francisco. How do you get a full blackout without being obvious? So Scharff Weisberg [supplier of the projection equipment] opened up the projectors and jerry-rigged them with mechanical shutters for New York.”

(Barbour and Johnson, 2004)

You have also made effective use of light angles to set scenes or change moods on stage? What advice would you offer on using different light angles?

“Glad you asked! In terms of how important light angles are, I can tell you that I start the design process with them. To me this is the most important element in storytelling. Light travels in a line until it hits something, then it reveals. This revelation is at the heart of your narrative – and how it happens depends on the light angle. So, it's critical that your light angles be compatible with the scenery and the story being told.

“Light angles have to be driven by the narrative. The continuity of a design falls apart if the light angles aren't compatible with the narrative. A couple of generalized examples: if the light angle isn't highlighting the expression of a character involved in something important, much of the meaning of that moment is lost. On the other hand, if the light angle is revealing too much of a character in a suspenseful scene, much of the impact and mystery are lost. These are two extremes, there are also many, many more subtle ways that light angle shapes the story.

“To get a real appreciation of light angles, you should look at the paintings of Caravaggio. They totally transform his work. His light angles have such power, especially as they work with his shadows. I have studied them, as well as the works of other artists, to inform my use of light angles in my designs for shows.”

(Posner, 2022)

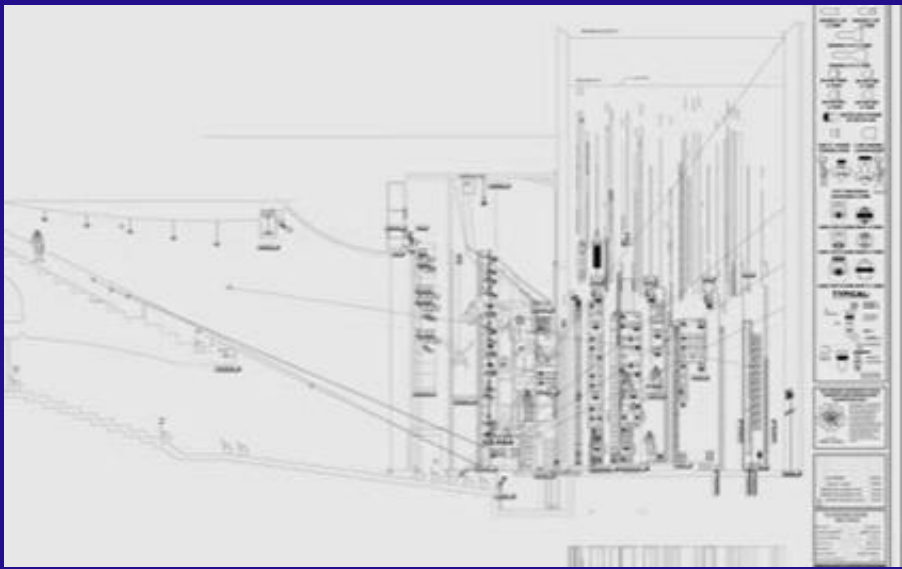
Lighting in *Wicked* is controlled off of a Wholehog II console from High End Systems, with the projections run off a Hog PC, with Artistic Licence's Common-Sense boxes used to control projector functions. Posner worked with programmer Warren Flynn and McCarthy worked with projection programmer Mark Gilmore. Again, the dividing line between disciplines grew ever more blurred. “In New York, we had a monitor off the lighting board, so we could see cues,” says McCarthy.

(Barbour and Johnson, 2004)

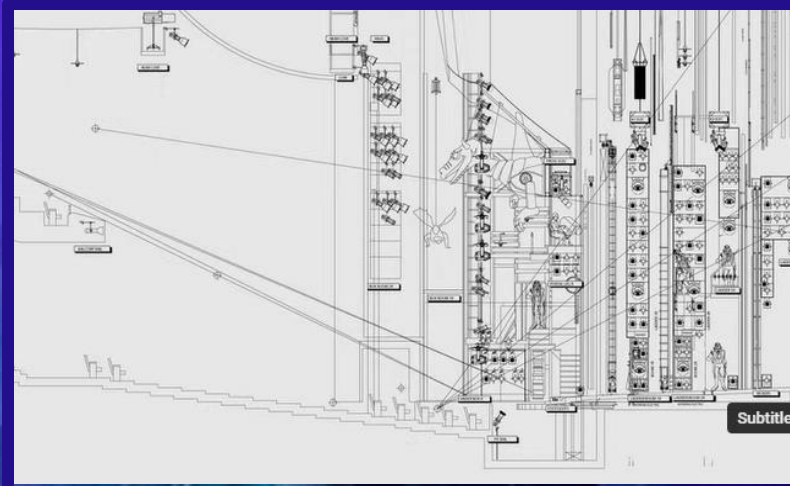


(WICKED The Musical, 2012)

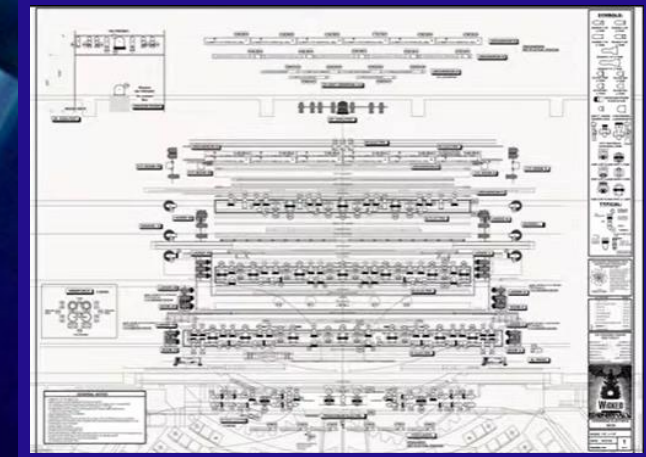
The background had been outfitted by many small LED green lights that looked like little speckles from the audience's view.



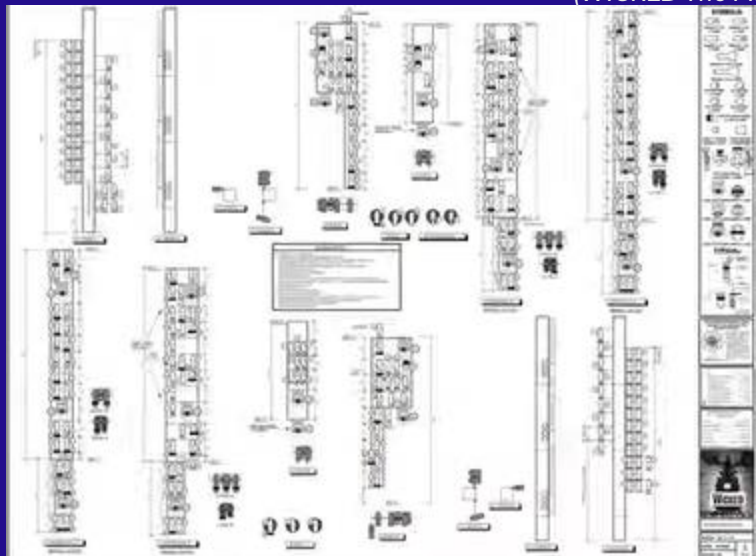
(WICKED The Musical, 2012)



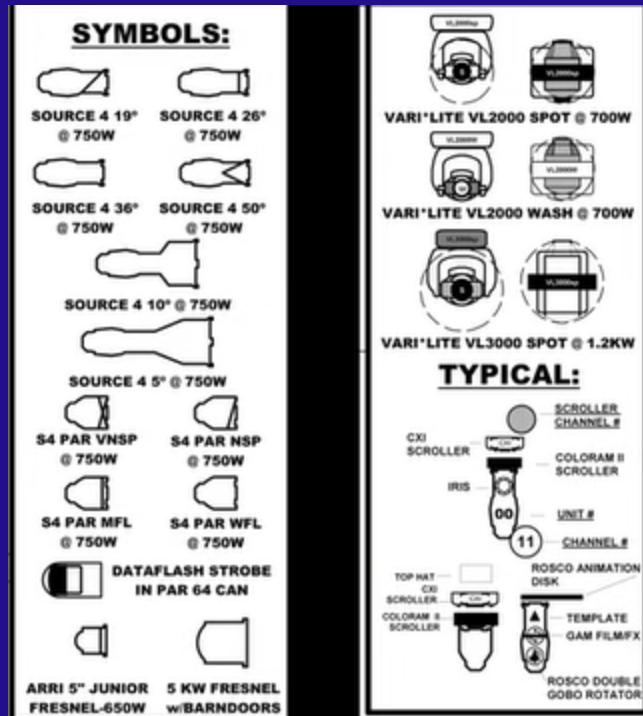
(WICKED The Musical, 2012)



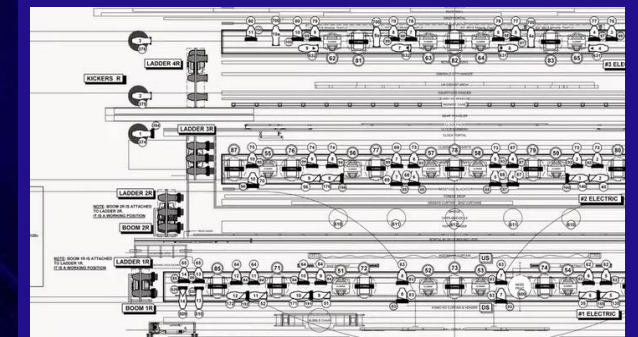
(WICKED The Musical, 2012)



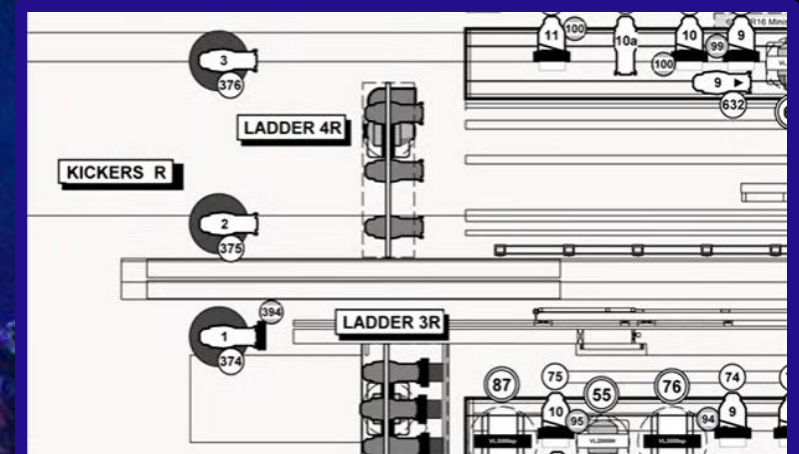
(WICKED The Musical, 2012)



(WICKED The Musical, 2012)



(WICKED The Musical, 2012)



(WICKED The Musical, 2012)

Wicked:

The lighting plot drawings of the Broadway show

Hairspray:



"As you mention, 'Wicked' is based on a fantastical setting that's large and spectacular. Eugene Lee's scenic design, which emulated the inner workings of a clock, and Susan Hilferty's magnificent costumes, created the sort of atmosphere that gives you license to be a bit more lavish with lighting. "Hairspray,' on the other hand, is grounded in the world of John Waters' Baltimore in the 1960s. So, in that case telling the story with light involved reflecting a very specific and very real time with patterns and colors at different locations. An interesting thing about 'Hairspray' is that we had a full-stage lit backdrop with 600 points of light. This was in 2002, so it was one of the first uses of LED in theatre. It was based on the classic Lite-Brite Magic Screen toy. "The LED lights that made up our background were originally manufactured for signs, but we converted them for theatre use. We didn't even have processing power to run this type of thing, so we had to use three different consoles, one for the Lite-Brite wall backdrop, one for moving lights, and one for conventional lights. Of course, today one console could handle all of this without breaking a sweat."

(Posner, 2022)

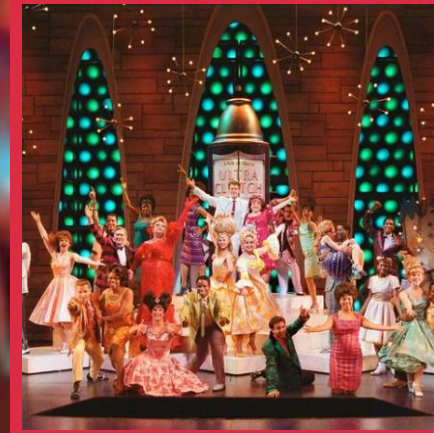


Photos credit: Paul Kolnik

Should a lighting design be a parttime historian too then?

"I think so. History was always one of my favorite subjects in school. I love it. In a way it was a chance to escape from this world and enter another, which always appealed to me. But beyond that, you really need to understand the context of a show's time, place and people when designing. It comes back to being a storyteller with light. The narrative has to drive your design. And to understand the narrative fully you have to understand its context by informing yourself about these things."

(Posner, 2022)



So, a familiar candy, and child's game of the era inspired part of your color scheme and backdrop for this landmark show?
"Yes, absolutely. I always look to outside sources to inform my designs. This may involve studying wallpaper patterns, old advertisements, film, or whatever. We've even used the polka dot go-go boot patterns in that particular show. In my view a designer should always be looking at outside sources to help drive a narrative."

(Posner, 2022)

What kinds of colors did you create on that backdrop?

"We let the narrative dictate that. Again, since this play was set in the '60s we used colors of that go-go era. Our scenic designer, David Rockwell produced the idea of using Necco candies — don't know if you remember them, but they're still around today — for the color scheme, because they have this pale but vibrant palette. I enthusiastically embraced the idea. They worked wonderfully to convey the sense of time and place."

(Posner, 2022)



Beetlejuice:



Posner's use of Mistrals on "Beetlejuice" marked his first deployment of Ayrton fixtures. His Associate Lighting Designer Anthony Pearson and Moving Light Programmer David Arch collaborated in the decision to use the 300 W spot luminaires after ACT Lighting demo'd the fixtures for them.

"For its compact size Mistral is a very diverse and bright fixture," says Posner. "I was especially enthusiastic about its size since the fixtures are built into the scenery, the interior of the house where the majority of 'Beetlejuice' is performed."

Eight to ten Mistrals light the entire large scenic unit while additional Mistrals fill in FOH in the light plot. "Mistral solved the power limitations we had," Posner notes. "Using an arc source was not an option due to electrical requirements. I also liked Mistral's great color mixing and customized templates."

(Staff, 2019)



Posner reports that Mistral has become "a reliable" fixture for "Beetlejuice" where there have been no equipment failures. "The Mistrals have held up really well even though they're subject to some rough treatment: The scenic unit tracks up and down the stage with some speed," he reports. PRG supplied the Mistrals for the musical.

Posner chose a pair of Diablo-S 300 W profile luminaires especially designed for stage applications for the Manhattan Theatre Club's production of "Long Lost." The scenic design by John Lee Beatty was comprised of three turn tables which transformed the space into five different realistic interiors. Posner found the Diablos to be "the right tool for helping to change the lighting for each location. Given its compact size, the variety we could get from the fixture was great. The color mixing, template indexing and quality of the edge are all very good. The shuttering was accurate and consistent."

(Staff, 2019)

Photo credit: Matthew Murphy

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My Self-Evaluation

In all honesty I enjoyed the lighting aspect far more than the sound, there is just something about the visualisation that really stands out to me. I do really need to spend more time outside of class practicing skills. The opportunity is there I just need to get up and make the most of it. I did do better this time around with my time management skills in regard to the progress workbook and I do think it is slightly more structured and informative than the last few submissions, one thing I know I need to do is to make the workbook more personal, more suited to me, something I won't dread to look back on (beside the sometimes horrendous pictures of me). The difference in class time involvement was quite jarring. I do believe I took a step back in this module. It wasn't intentional at all. I was completely out of my depth, especially around the beginning of the module. I think it may boil down to lack of confidence especially after the warnings about the cost of the lights and control desks, I just didn't want to damage anything or delete something important by accident. During the previous modules, while it was still new in the way it would be marked and such, it was still around things I was familiar with, the tools, the materials most of it I had used before, this was different, but I was willing to learn and definitely want to revisit it. Despite that, the longer we had with the lighting board for the project the more settled I felt but I was still hesitant. I was happy with my lighting project, and I did love designing it to fit around the Joker, and Felix did such an amazing job. The sound on the other hand was... still interesting but didn't quite captivate me as much as the bright lights. Being able to rig the space for the skills competition was good practice for the skill and I was nice to be able to ask around the class for help if needed, I do believe we have gotten better at figuring out how to work together better. It's not perfect, nowhere near that truthfully, but it has improved vastly. My Q-Lab skills are still sadly very questionable. I do have a list of tutorials for future reference, and I will try and book the MacBooks out for some basic practice as it is something that would be needed to know how to use in the future. It may not be the road I want to go down it is a useful skill to know. So all-in-all I need more practice and perhaps patience in the lighting and sound part of design. The behind-the-scenes aspect that really help the play or musical or film or recital or whatever it is that needs it come alive and provide the audience with the show they deserve and didn't expect. I wouldn't despise having that ability.



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