Film-Tech

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FILM NOTES FOR THE REEL PEOPLE

H-50-17

A TECHNICAL SERVICE FOR FILMHANDLERS FROM EASTMAN KODAK COMPANY

"KEEP 'EM COMING BACK!"

Introduction

Your image. It's the first impression that you make on the people that you meet. If it's not positive, it may be the last. In the theatre business, your "image" extends beyond your own person to encompass the picture you present on the screen. And if this image is substandard, out of focus, out of frame, scratched or just plain dirty, it might be the last time your patrons choose to visit your theatre.

Since we are all in the exhibition business to keep customers happy and "Keep 'Em Coming Back," let us take a look at the tools and equipment needed to ensure proper projection.

In keeping with the tradition introduced in Kodak's Management by Observation traveling field seminar, we would best approach the subject of image and projection by discussing the components that make for top-quality results. As theatre managers, you may never have occasion to run your own projection equipment. You may not even go into the booth. But being aware of those areas that can distract from the enjoyment of the film is of primary concern. Being able to observe them from the customer's viewpoint and remedy them (or asking your projectionists to do so) is of major importance in maintaining a high quality presentation, hence the title "Management by Observation."

After the visual problem is identified, not only can you take a troubleshooting

approach to correct it, you can also develop ongoing programs to prevent recurrence.

So step out of your manager or projectionist shoes for a few moments and ask yourself the question: Would I like to see a movie in my own theatre? You and your spouse, friend, or sidekick have just left the comforts of home, maybe left your kids with a babysitter, enjoyed dinner at a local restaurant, and headed for the neighborhood cinema. A familiar scene . . . happening coast to coast every night of the week. You part with your hard-earned dollars at the box office, drop $5 or more at the concession stand, and enter the darkened auditorium wanting to be entertained. If the setting is conducive, you await the start of the show with anticipation, munching on your popcorn as you make small talk with your companion. Bear in mind: At this point, you have invested significant amounts of money and time expecting a good show—the best show you can get. You have a right to have your expectations fulfilled. You want to be swept away into the magic of a larger-than-life showcase unfolding before your eyes. And so you should be!

But what are some of the things that can go wrong when the lights go down and the curtain goes up? What do you often see on the screen that you didn't pay to see?

To get to the heart of correcting visual problems, we must first understand the systems in the projector. It is the nerve center of the ominous little black room lurking at the rear of every theatre: THE BOOTH. To most of us, our first venture into the forbidden territory of "THE BOOTH" was purely terrifying! Thousands of feet of film quickly traversing from wall to wall, sounds competing to be heard, lights reflecting through small squares of glass—clearly beyond anyone's capacity to harness. But once the terrain becomes more familiar, it's really quite simple. Every projector contains four primary systems: the lens, light source, roller transport, and sound apparatus. (The booming technology of sound is a separate category and will be discussed in an upcoming issue of Film Notes for the Reel People.)

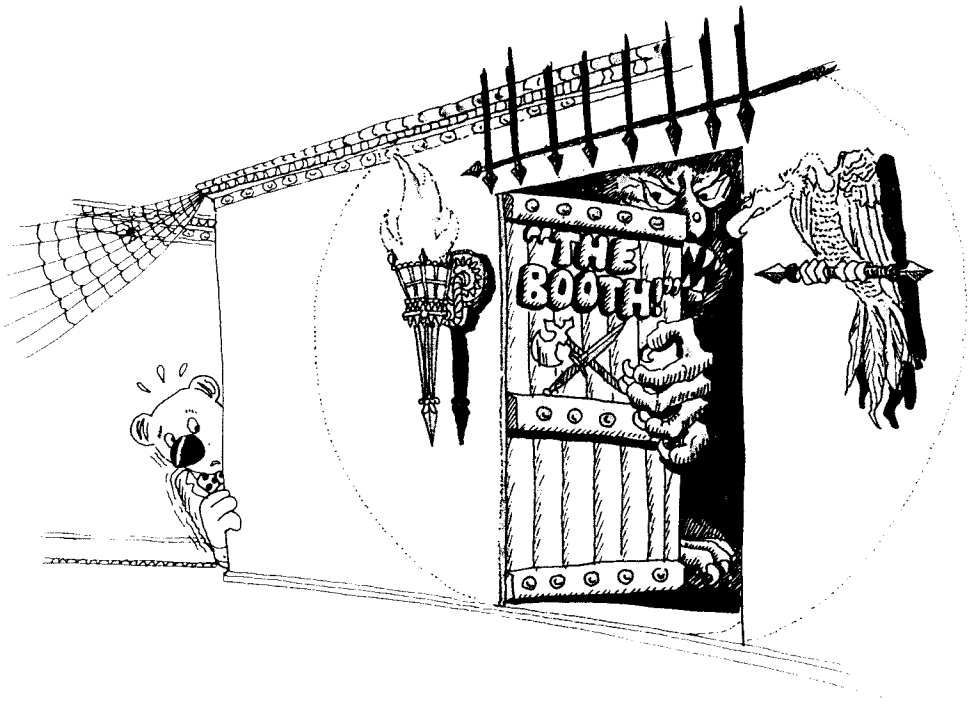
Lens and Image Components

One of the most obvious manifestations of a problem occurs when the wrong lens is used. "Fun house mirror" images should be left to an amusement park. The anamorphic or "scope" lens squeezes the image to fill the widescreen format while the flat lens is used for the traditional screen format. Don't run any of the film in the wrong mode for *any* reason—even if it's only the trailer or your institutional artwork. If you don't have time to make a lens change between a flat trailer and a scope print, it's better to delete the trailer altogether. Remember: The very first image that fills the screen sets the tempo for what is to come for the audience.

The lens can be a source for other presentation irritants as well. Dirty or clouded lenses make for foggy, dull images. Both the front and rear outer surfaces of the lens should be cleaned regularly, particularly if anyone smokes in the booth. Clean carefully with lens tissue and lens cleaner. The few pennies you might save by using commercial glass cleaner will cost you hundreds of dollars in the long run because you will scratch and abrade the surface of the sensitive lens coatings, rendering them damaged and unable to diffuse light beams properly. While you're at it, clean the port glass. Smoke and dirt build up on these glass surfaces, too. You'll see a bright new world from the booth and your audience will thank you!

The aperture plate is another component which must also match the format of flat or scope image. It is intended to do at the projector what the masking does at the screen: provide a sharp clean image frame. Because of its proximity to the film moving quickly through the gate, the aperture is a prime candidate for oil and emulsion buildup. That wavy line your patrons might see at the top of the screen is probably not a masking problem, but a dirty aperture plate. It's important to remove this debris with a lint-free cloth or a piece of lens tissue. Fibrous material will leave its own tell-tale remains: a string or fuzz attached to the aperture. Magnify that through your projection system and you've only compounded the buildup problem!

Filing an aperture can also be tricky business. Because of the intense magnification, move carefully if your plate is causing sloppy image spillover at the screen's edges. If you file too deeply, the opening will be too wide, reversing the original problem. Check the sharpness of the aperture edge after each pass of the file. You can always do more, but once you've filed too much, the plate is ruined.



MAINTAINING CLEAR FOCUS

Although you will set your focus early in the presentation, concentrating on a face, preferably in close-up, you must leave the booth to check it. Proper focus can be determined only from the audience perspective in the auditorium itself. Select a point about midway into the theatre and check the focus as the audience views it. It is impossible to obtain a 100% accurate reading from the booth because of the distance, the port glass, and the angle of viewing.

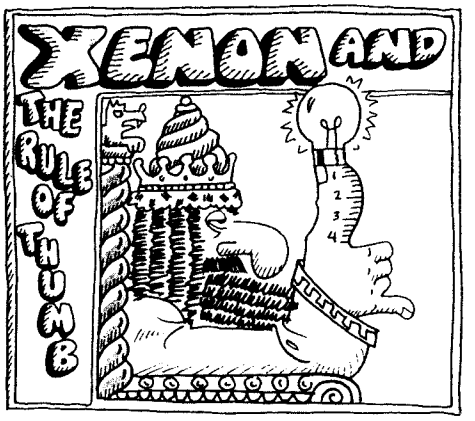
If you find a soft image on the screen without crystal-clear sharpness, check the lens elements. Accumulated dust or dirt on the front and oil or carbon deposits on the rear will make a well-defined image impossible. Improper projection angles will cause problems not only with focus but with keystoning. Check the projector and mirror alignment relative to the tilt of the screen. Although you may not be able to make a quick correction if screen tilt is involved, opt for focusing on the lower two-thirds of the screen if necessary since most of the action of a movie takes place in that area.

If the image cannot be focused or if it goes in and out seemingly at random, it is probably due to excessive heat from the lamp. Another manifestation of this problem may be a "hot spot" on the screen—an area with glaring brightness. If mirror adjustments fail to remedy the situation, consider reducing the wattage of the bulb or re-positioning it in accordance with the lamphouse alignment manual. Luminance at screen edges should be approximately 75% of center. SMPTE publishes screen brightness standards and also has a measuring tool available.

The Light Source

The majority of theatres today use the xenon bulb rather than the carbon lamp. Although the bulb itself is one of the more costly items to replace, the show cannot go on without it. It is recommended to keep a lamphouse log which tells you at a glance the number of hours you are getting on the bulb. A rule of thumb is that the numerical designation on the package indicates the minimum number of hours of expected bulb life. (For example, 3000-series bulbs should provide adequate luminance for at least that number of hours of use.) Bulb manufacturers recommend turning the bulb 90° at 25% of its expected life to prolong brightness. If it is turned every 750 hours for a 3000 bulb, the life expectancy will be increased significantly. This rotation keeps the gases flowing and helps to prevent flat spots and dark areas from forming.

From the standpoint of troubleshooting, the most common problems are: no light, flicker, low output, and intense heat. If you have no light and the bulb itself is not burned out, the malfunctioning of the lamphouse fan may be to blame.



Without proper ventilation, the interlock safety system cannot function. Also check the circuit breakers and fuses in the system. Flicker occurs when the xenon bulb is failing and may require replacing the bulb. Broken diodes that don't make continuous contact may cause flicker as well. That familiar culprit DIRT may be to blame for low output, so check all the usual loitering spots: lens elements, mirror, and the screen.

But low output may also be the result of a low current needing a boost, improper light-to-mirror distance, or mirror-to-projector distance that should be adjusted. Check these distances through trial and error first before moving the bulb itself. If it is positioned too close to the film, it can cause blistering and erosion of the emulsion surface and, in extreme cases, may even cause the film to catch fire. If the screen image is too large, the effect will be a dilution of the light, causing it to appear too dim. This may be rectified by increasing the focal length of the lens or bringing the screen masking in to limit screen size. Although the ideal method for containing stray light rays which also result in diluted output is to curve the screen, this method is often too costly or grandiose to consider. Excessive light output may once again be caused by improper light-source-to-mirror distance or mirror-to-projector. Be sure to check the projector manual for the recommended wattage for the xenon. Wattage that is too high is not only more costly, but can strain the electrical system and over-illuminate the film. Stainless steel wire of a very fine gauge installed between the lamphouse and projector may also cut down the excess light. Although this is generally an acceptable procedure, it still is a waste of light energy and the lower wattage bulb is probably more appropriate to consider.

The Moving Image

When all the stationary components of the projector are working and the film actually begins moving through the gate, another set of problems can cause your customers nightmares (and you will have to listen to their outcries of misery if you can't alleviate their discomfort quickly!). There is nothing so distracting as image unsteadiness. The primary causes are charted below along with their remedies

Another uninvited visitor in your theatrical presentation may be a travel ghost. He seems to pop up out of nowhere and onto adjacent dark areas

1. Perforation damage	Check for burred or bent sprocket teeth and replace.
2. Irregular intermittent movement	Loosen cover screws to tighten cam against starwheel; if wear is excessive, replace.
3. Threading loops too small	Re-thread to provide 21 frames between gate and soundhead for optical sound and 28 for magnetic.
4. Lack of lubrication	Use light film lubricant on pads or apply directly to alternate edges of film with fingertips.
5. Trap rail deposits	Scrape rails; then clean with alcohol/water solution and wipe dry with lint-free cloth.
6. Gate tension	Increase or decrease as determined by trial and error; check for sufficient spring tension.
7. Lateral guide rollers (Horizontal weave only)	Adjust so that inner rail fits smoothly against film edge and outer is flush with fixed flange of lateral guide roller.

TIP: If the image unsteadiness problem is rooted in burred or hooked sprocket teeth, you will be able to hear a rhythmic "click" as the film catches on the offending tooth or teeth, so one of your first clues will be audio.

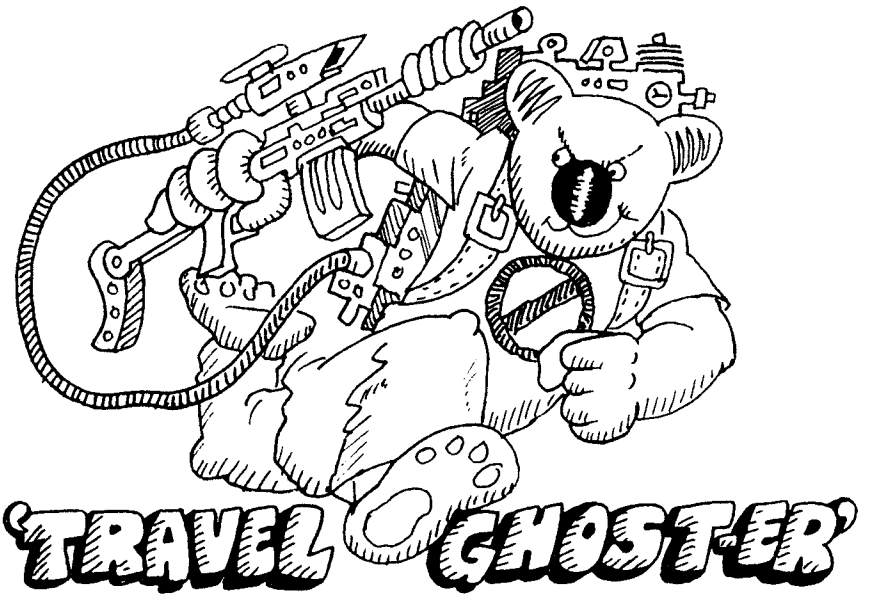
of the film. It is seen as the bleed-through or split-second delay of an image after its original appearance. It is caused by an incorrectly timed shutter and should be adjusted according to the projector manual.

Scratches on the film create a serious visual problem not only because they are extremely distracting to an audience, but also because they permanently damage the film. Because they cannot be removed, they must be avoided. The best preventive maintenance is to keep the film from coming into contact with any abrasive surfaces during buildup, platter loading, and teardown. Handle film at the edge wherever possible and always use lint-free gloves when working with the film. Make the path from rewind to autowind to platter as smooth as possible, permitting the film to go from reel core to core and not contacting edges or traveling through twisted convolutions unnecessarily.

But the most pervasive scratches are those caused by components and rollers. After threading and securing film on the take-up platter, take a few seconds to retrace your path through the trail of rollers and flanges. Although you may have taken care to seat the film firmly in the center of each roller as you went along, there is no tension on the film until it is secured at the take-up platter. It is very easy for it to ride up onto the flange and scratch every inch of film that passes through the faulty area. Burred edges on the aperture, flat spots on rollers, and nicks in platter surfaces may also be lurking to cause unsightly and irreparable scratches on the film, so look closely.

Dirt—the Worst Four-Letter Word in the Theatre

Worried about outcries from parents about the proliferation of four-letter words in the movies? Although that may be a social problem for a theatre manager, there's another four-letter word that will turn away even the roughest-hewn patrons. No one is immune to the perils of DIRT. And if you don't actively chase it away, it lurks in almost every aspect of the film presentation to scare off even the stouthearted.



In the theatre itself, vacuum the screen masking and dust the screen lightly with a feather duster or a screen brush. The last issue of FNRR dealt in depth with screen cleaning, but remember that a feather duster or screen brush is safe to use on *all* screens, regardless of surface. Just be sure that you do the entire screen, not just the lower half, or you will have an uneven tone on the screen itself which can cause uneven brightness when projecting.

Housekeeping in the theatre, lavatories, and concession areas is a topic unto itself. Just keep asking yourself the question: Would I want to be a paying customer in this theatre? Judge your level of cleanliness by your own honest response to this question.

If your good-housekeeping practices don't extend to the projection booth, however, it's not just a matter of aesthetics. An unkempt booth can wreck havoc on the film itself. Those ugly black splotches with which we are all too familiar during a presentation don't get there in a clean environment. Be sure to use lint-free gloves when handling the film. No matter how clean you keep your hands, the natural body oils will transfer from your hands to the film, causing it to be susceptible to picking up dirt. Not that it needs any help! That magnetized strip traveling at a high rate of speed seems to attract every piece of litter and speck of dust in the area. If your booth floors are not meticulously clean, that debris will usually end up on the film, particularly if the bottom roller on your platter transport system is close to the floor.

And what about that ashtray on the rewind bench? Just where do you suppose those ashes will attach themselves during teardown? And please don't be the "Other Guy"—treat the film as carefully during teardown as you would during buildup. If you don't, it's really the audience that suffers.

Splicing

Going through a film inch by inch as you build it up may save you lots of untold agonies during the presentation. That "Other Guy" may not have been as conscientious about film handling as he or she should be. Running your gloved hands lightly against the film's edges as you prepare it for showing will allow you to find splices and check them to see if they were done correctly. Is the splice done at the frame line? Are there the proper number of sprockets showing (4 for 35 mm, 5 for 70 mm)? Is non-oozing splicing tape used? Is the splice taped on both sides? Are both film sides aligned so that potential sprocket damage will not happen as film crinkles going through the projector?

There is no need to remake a splice if it is done in accordance with the above guidelines. But, if it isn't, wouldn't you rather know about it *before* the audience does?

It's up to you. Only you can "Keep 'Em Coming Back." If you don't take the time and the care to provide the best show in town, your customers won't be around. They will find the best show elsewhere. And, sad to say for all of us, the customers might find they get a better show in their own homes. Think about it.

LEXICON

Abrasion: Scratches on the film caused by dirt, improper handling, emulsion buildup, and film damage.

Anamorphic: A lens which squeezes a wide image to fit into a standard frame width. The anamorphic projector lens then "unsqueezes" the image and spreads it horizontally.

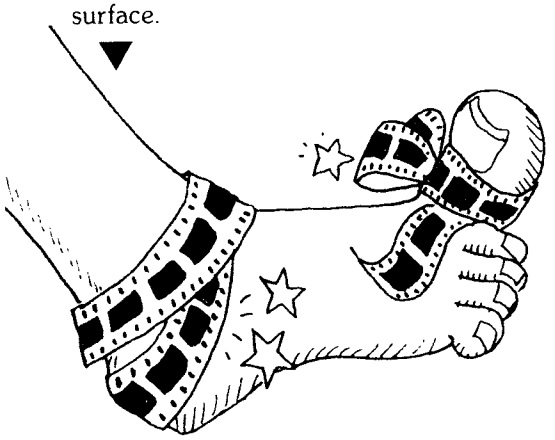
Angel Hair: Fine hair-like skivings caused when the film edge rubs against a sharp edge in the projector. Also caused by excessive lubrication at the lab.

Aspect Ratio: The ratio of the width to the height of the screen. Standard size is 1.85:1; Cinemascope and Panavision are 2.35 to 2.55:1.

Backlighting: Lighting wherein the main source of light is behind the subject, silhouetting it, directly towards the camera.

Base: The transparent surface, usually celluloid triacetate, onto which photographic emulsions are coated to make film.

Blistering: The effect of excessive heat on the emulsion surface that usually appears as bubbles in the surface.

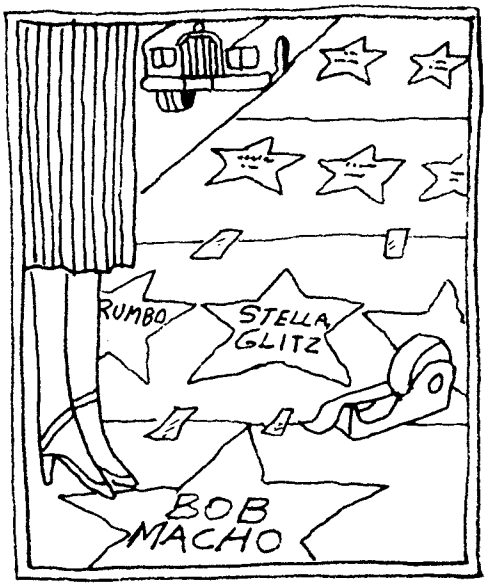


Blooping: A small patch placed over a splice on the sound track to cover the noise of the splice.

Burr: Physical damage to a sprocket tooth or another metal projector component causing it to protrude, buckle, or form a rough edge.

Butt Splice: A film splice in which two precisely cut ends are held together with splicing tape and do not overlap.

Candela: International unit of luminance measurement.



Cement Splice: A film splice made with solvent cement in which two cut ends of film overlap.

Changeover Cue: Small spot in top right-hand corner of the frame to signal the projectionist that the reel is about to end.

Cinch Marks: Short scratches on the surface of the film parallel to length; caused by allowing one convolution of film to slide against another during winding.

Cinemascope: The first commercially successful anamorphic presentation system. The image is horizontally expanded. See ANAMORPHIC.

Cinematographer: The director of photography who is responsible for camera and lighting on a production set.

Cinerama: Originally, a wide screen technique using three electronically synchronized cameras when shot and three 35 mm projectors when presented on a deeply curved screen. The process has been abandoned due to the distracting seams from the three separate images. it is simulated today by using a 70 mm single image that is purposely distorted and projected into the curved screen.

Clatter: Noise caused by excessive gate tension and/or insufficient film lubrication as the film passes through the gate.

Cropping: To change the size of an image being projected as a print. It is usually the result of improper masking, aperture plates, or incorrect focal-length lenses.

Development: The chemical process which brings out the latent image in the film. "Underexposure" and "Overdevelopment" are both extremes in the process which refers to the balance of light and dark.

Dishing: A loosely wound (or sometimes very tightly wound) roll of film that has slipped edgewise to form a concave or convex form similar to a dish.

Dolby: Trademark for a noise reduction system used frequently in stereo sound tracks on film.

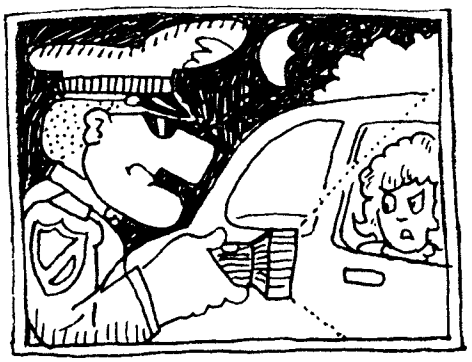
Dowser: A device in the lamphouse used to interrupt the beam of high-intensity light when the projector is not in operation. It is used to protect both the shutter and the film from sever heat blistering and damage when they are not moving.

Emulsion: A light-sensitive photographic material consisting of a gelatin emulsion layer containing silver halide and other ingredients required to produce the desired image properties.

Estar: The trademark for the polyethylene terephthalate film base manufactured by Eastman Kodak Company.

Exchange: A depository and inspection center for theatrical release prints. Distribution is usually handled for the United States from approximately 30 centers or "Exchanges."

Exciter Lamp: A dc operated incandescent lamp that provides the light source for the sound-scanning beam.



Exposure: Film can be overexposed to give a very light, dreamy quality to the image, or underexposed to make the image darker than in reality.

Falloff: The gradual reduction in luminance from the screen center to the edges.

Feed Sprocket: Any driven sprocket that withdraws film from a supply reel.

Film Gauge: Film is made in various widths measured in millimetres. Most commonly used gauges today in theatrical presentation are 35 mm and 70 mm, although 70 mm is usually originally photographed using 65 mm stock.

Filter: Plates of glass or gelatin placed in front of a lens as a scene is being shot to alter light quality. They may change color or simply lighten or darken.

Fire Shutter: Small shutter placed behind the film aperture in the projector gate. It opens only when the projector has reached operating speed and drops if speed is reduced to protect the film.

Flange: The rim on a roller used for guiding the film. It can also be a large disk used on a rewind to take up film onto a core.

Flicker: A cyclical fluctuation in light intensity caused by passage of the shutter across the light beam.

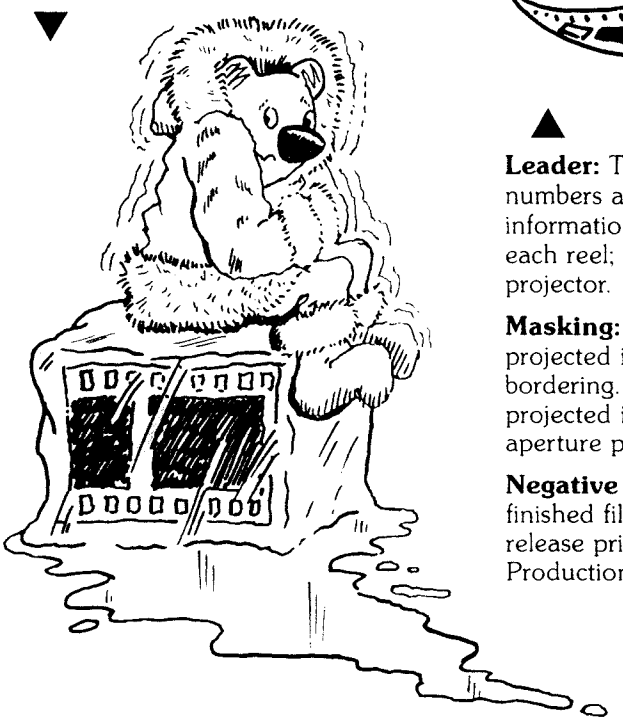
Focus: To adjust the lens so that the sharpest visual image is produced.

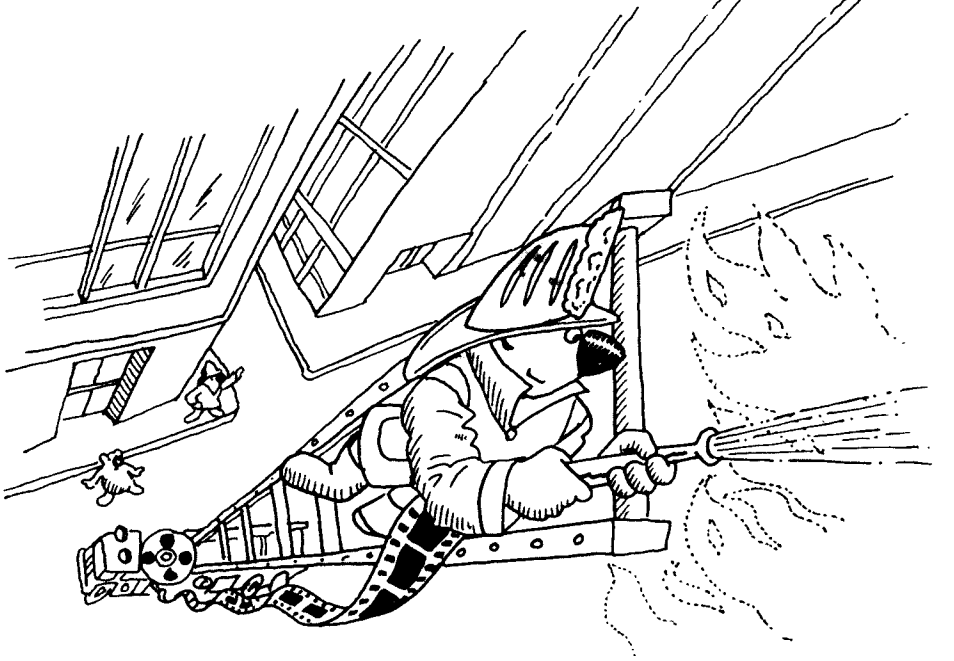
Footlambert: US luminance measurement unit.

Format: The size and type of screen images. It includes the width of film being used and type of sound application.

Frame: An individual picture on a film strip.

Freeze Frame: A shot in which one frame is reprinted many times to give the effect of a still photograph.





Gain: The measure of a screen's ability to reflect light.

Gate: The projector assembly that holds the film at the aperture, rigid and perpendicular to the optical axis.

Gate Tension: The resistance to film movement produced by adjustable spring-loaded rails in the projector gate.

Glove: A white, lint-free glove used when handling film. *SHOULD BE USED IN ALL FILM HANDLING AT ALL TIMES!*

Lamphouse: The complete light unit containing either a carbon or a xenon bulb, optical components, and operating controls.

Leader: The piece of film printed with numbers and reel identification information attached to the head of each reel; to be used in threading the projector.

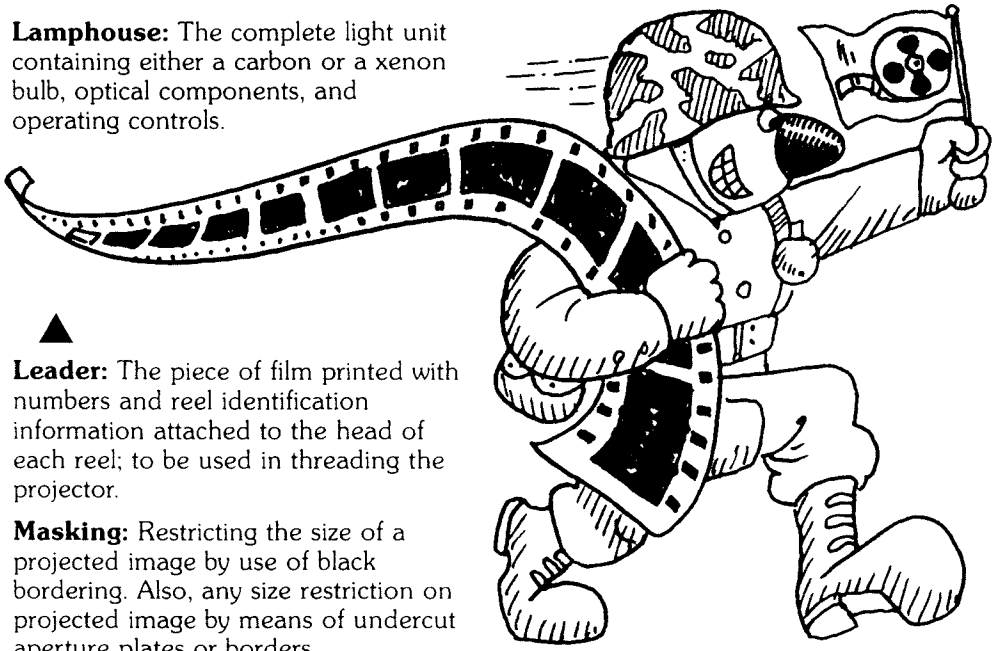
Masking: Restricting the size of a projected image by use of black bordering. Also, any size restriction on projected image by means of undercut aperture plates or borders.

Negative Cost: The cost of the finished film not including the cost of release prints, publicity, etc. Syn: Production and postproduction cost.

Negative Image: The processed image on negative film. The negative is dark where the original scene was light, etc.

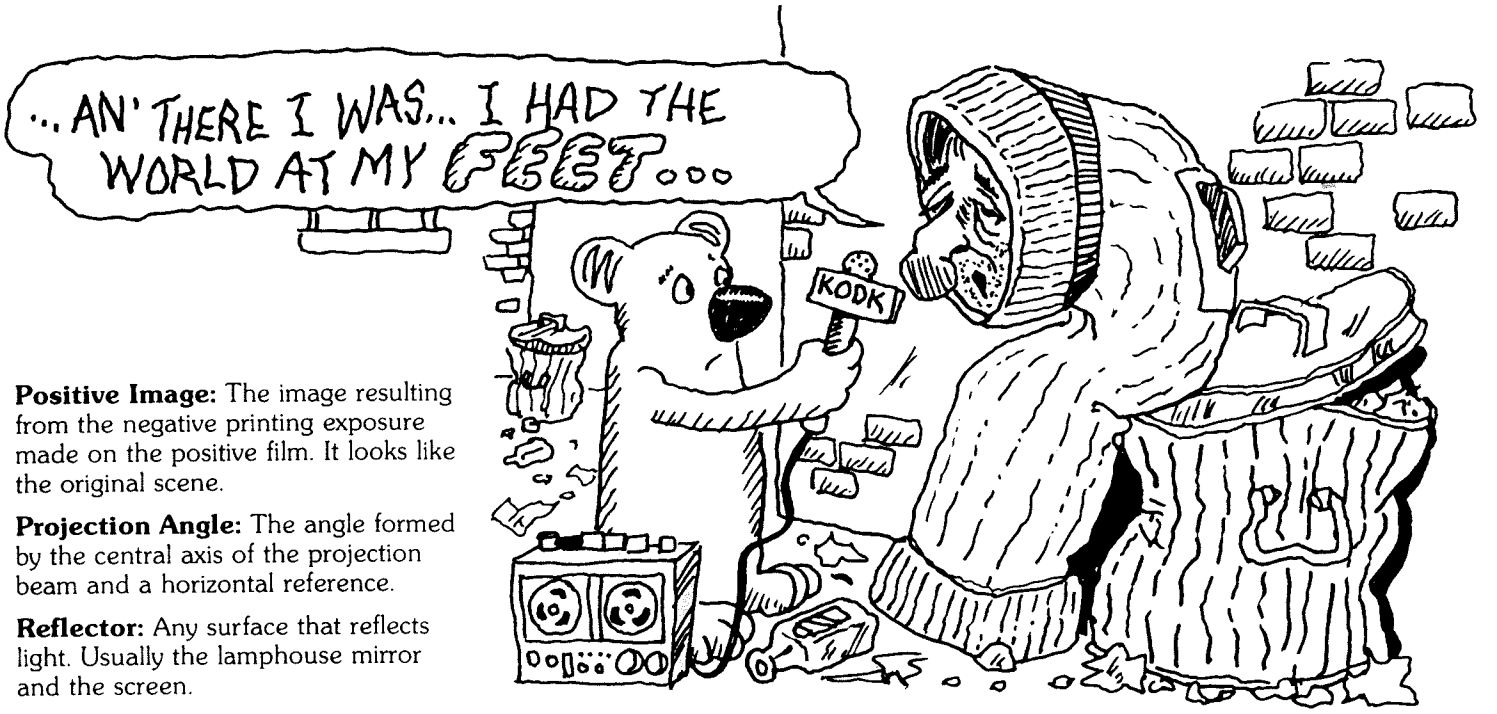
Optical Printer: The machine that duplicates a filmstrip. Many technical operations are performed here, including opticals and balancing of color values.

Out-of-Frame: A projected image not centered vertically on the screen causing a portion of the frame line to be visible during projection.



Perforations: The symmetrical precision holes in the film's edge to accept the teeth or driving sprockets.

Platter: Film transport device consisting of three or more horizontal platforms which rotate, each capable of holding up to 25,000 feet of film and providing up to 4½ hours of continuous projection.



Positive Image: The image resulting from the negative printing exposure made on the positive film. It looks like the original scene.

Projection Angle: The angle formed by the central axis of the projection beam and a horizontal reference.

Reflector: Any surface that reflects light. Usually the lamphouse mirror and the screen.

Rewind: An automatic console or set of bench-mounted spindles used to wind film from reel to reel.

Rough Cut: The first assembly of the film which the editor prepares from selected takes, joining them in the order planned in the script. Also called a "Workprint".

Sensor: A device used to actuate an electronic circuit or a mechanical system, stop, or alter direction. In projection, it is used for changeovers, shutoffs, and automation.

Shutter: A two-bladed rotating device used to interrupt light source.

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Stray Light: Light which does not contribute to the purpose for which it was intended; all the non-image producing light hitting the screen.

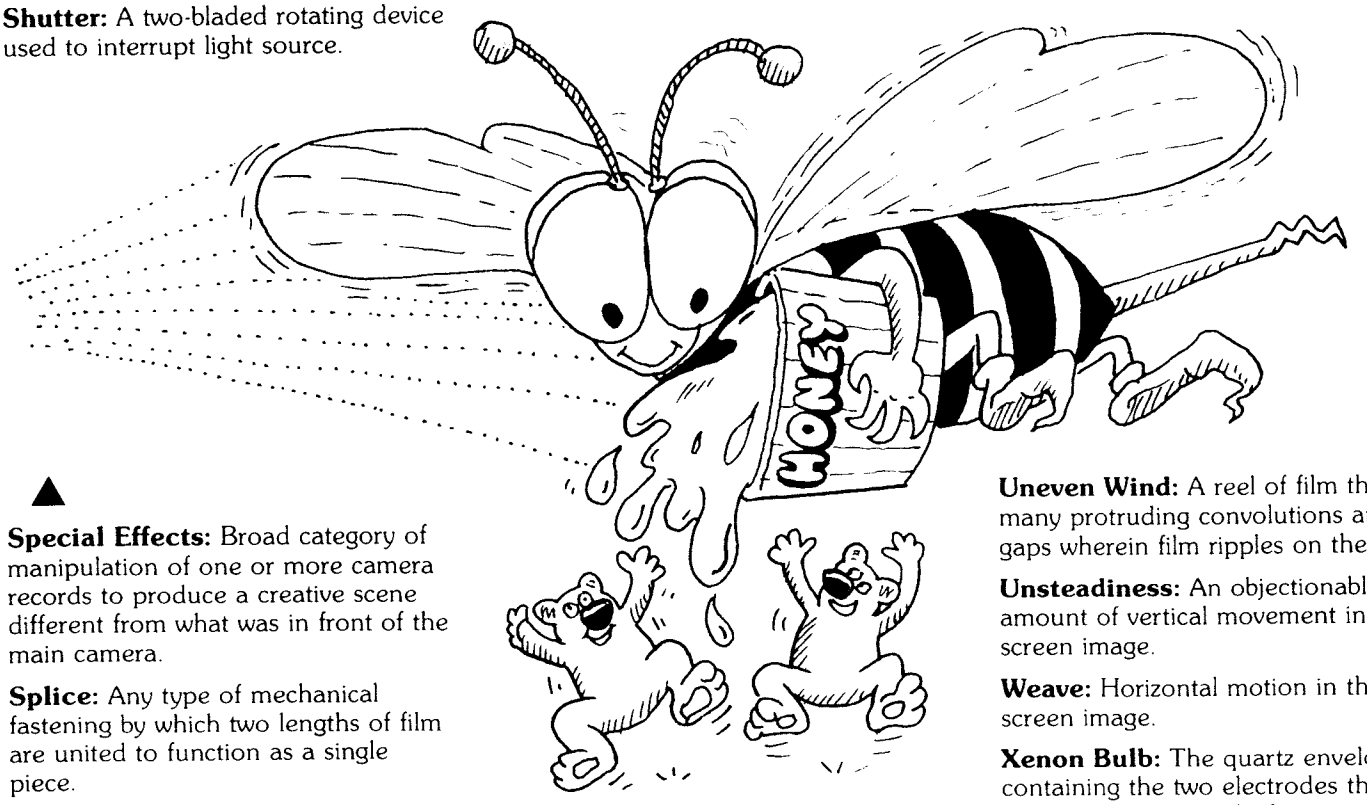
Take-up Reel: The reel onto which the already projected film is wound.

Throw: The distance from the projector aperture to the center of the screen.

Tight Wind: Film wound so tightly on a reel that it cannot safely be handled or shipped without danger of cinch marks and/or edge damage.

Trailer: A short reel of film containing coming attractions or institutional messages or advertising.

Trap: The fixed component in a film gate assembly.



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Special Effects: Broad category of manipulation of one or more camera records to produce a creative scene different from what was in front of the main camera.

Splice: Any type of mechanical fastening by which two lengths of film are united to function as a single piece.

Sprocket: A toothed wheel used to transport perforated film.

Uneven Wind: A reel of film that has many protruding convolutions and gaps wherein film ripples on the reel.

Unsteadiness: An objectionable amount of vertical movement in the screen image.

Weave: Horizontal motion in the screen image.

Xenon Bulb: The quartz envelope containing the two electrodes that produce an arc in a high-pressure environment of xenon gas.

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