Film-Tech

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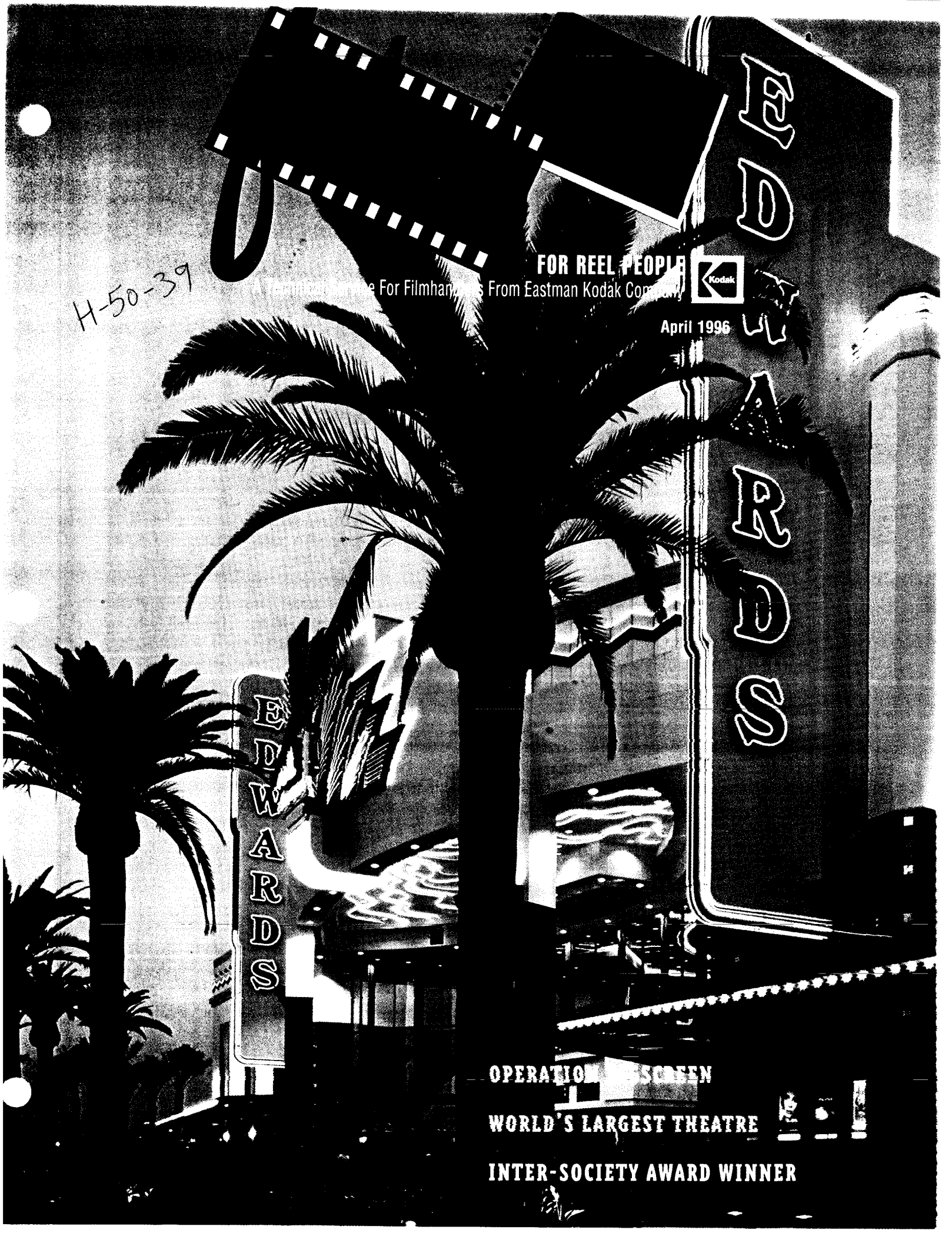


H-50-39

FOR REEL PEOPLE

A Technical Service For Filmhandlers From Eastman Kodak Company

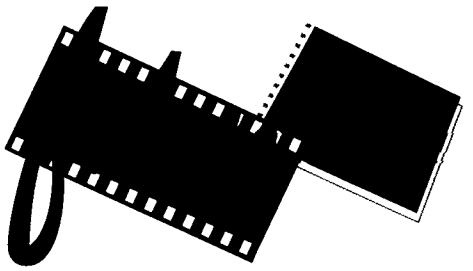
Kodak

April 1996

OPERATION BIG SCREEN

WORLD'S LARGEST THEATRE

INTER-SOCIETY AWARD WINNER



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Cover art courtesy of Edwards Theatres

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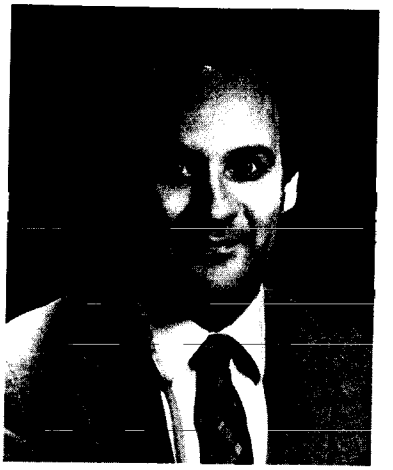

JOHN PYTLAK
Senior Technical Associate
Motion Picture Systems Development Group

Question:
Our new theatre complex has screen sizes ranging from 18 feet wide to 60 feet wide. The smaller auditoriums are equipped with flat matte (gain =1) screens and 1600 watt xenon lamps. The biggest auditorium has a 1.5 gain curved screen, and the projector lamphouse has a horizontal 4000-watt lamp operating at 155 amperes . The screen is so big that we had to use a "silver" mirror to get a bit more light output, and need to focus the lamp to get 11 footlamberts screen luminance at center screen. We've had the optical alignment of the lamphouse checked, to no avail. Our audiences really like the "big screen" experience of the flagship theatre, but frankly, I think the quality of the image in the smaller auditoriums is better. I've noticed that the pictures on the largest screen don't hold focus well and seem to flutter, especially in the closing credits. The edges of the picture are noticeably darker than the center. We've even been charged for ruining a print we played for five weeks in the large theatre. The distributor claims we caused heat damage with a "hot spot." Why is it so much easier to get a uniformly illuminated, bright, sharp picture on a smaller screen? Is there anything we can do to improve our "big screen" image quality?

Answer:
The challenge is to put enough visible energy through that postage stamp size frame of film to light a screen with as much square footage as a small house (60ft.x25ft.=1500 square feet), without burning the film.

I'll assume there are some things you cannot easily change: the shape of the auditorium, the seating, and the distance from projector to screen. I'll also assume the radius of screen curvature was optimized for the seating by a competent theatre designer. Some components of your projection system were not the best choice. For example, your 4000-watt lamp has a light output of about 155,000 lumens, enough to adequately light a properly curved 1.5 gain screen 48 feet wide (960 square feet in area). Your screen has over 50 percent more area, so it's no wonder you are struggling to get enough light. You've tried to compensate by running your

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Photo courtesy of Pacific Theatres

They dot our landscape. One in Washington, D.C. New York City. Another in Dallas. No fewer than four under one roof in southern California. They're not limited to the United States. One of the largest in the world is in Paris. And, in typical Hollywoodland parlance, "If BIG is good, isn't BIGGER always BETTER?"

They are heralded as "wall-to-wall excitement" and "biggest in the world." They are larger-than-fifty-feet-wide theatre screens. Exhibitors seem to have breathed new life into the very wide screen with many complexes on the drawing boards which feature at least one of the huge auditoriums. It is an exciting time for the movie business as the once *de riguer* concept of "bigscreen" receives a fresh infusion of life from forward-thinking theatre circuits.

The multi-plex boom of the 1960's and '70's spawned "shoeboxes," narrow auditoriums, imperfect light, questionable sight lines. In the last decade, the configuration of choice appears to approximate a shoebox turned ninety degrees with the screen inching ever closer to the edges of the longer side of the rectangle. This "wall-to-wall" layout has received enthusiastic response from the movie-goer. As the screen extends to cover most of the front of a theatre, the essential difference that has always existed between theatre and home viewing increases.

But there are a number of other concerns as the screens expand. One of the main ones is the amount of light illuminating the picture. Audience approval likely will wane if the image is dim and color is dingy.

Several months ago, Kodak launched a major exploratory project to address lighting the large screen in today's theatrical environments. Stated succinctly, the goal is to provide the brightest screen image with the least amount of wattage possible. Toward that end, Kodak engaged the services of Larry Jacobson's LJ Technologies to conduct tests in real-life theatre settings. Mr. Jacobson's mandate is to precisely evaluate present available equipment and contact manufacturers so together they can construct a model for bigscreen equipment. Not only is the project broad in scope, but also a challenge to the research and development departments of theatre equipment manufacturers to propose answers to the issues generated by bigscreen projection.

Jim Edwards of Edwards Theatres in California strongly supports the project. "The audience response to our four seventy-eight-foot screens at the Spectrum 21 is just unprecedented. We usually work more than one print of new movies, showing one on a bigscreen and one or more in our smaller theatres. The phone lines became so clogged with people calling in to

determine whether the movie was showing in a big house that we began stating in which venue a feature was playing on our answering machine and in the newspaper," he said. "We are absolutely convinced that the public just loves the big screens-so much so that we plan to incorporate at least one bigscreen application into most of our upcoming projects." Edwards has done more than just advocate the project. He has volunteered the use of the Spectrum 21 as a "laboratory" to conduct the process.

The suitability of the complex is ideal. There are four six-hundred-seat auditoriums; two are stadium, two are not. Screen size is nearly identical in all four. Working on this Kodak project, Larry Jacobson is able to perform very informative side-by-side comparisons of virtually every aspect of theatrical presentation.

Jacobson advocates a "systems" approach for a true bigscreen package. During a recent conversation with Cineplex's John Wolski regarding the efficacy of various projectors, lamphouses, and consoles, he suggested: "As an industry, we need to talk in terms of *process*, not *product*. We need to be more results-oriented. For instance, if an aperture size is inadequate, trying to pump more light through it will accomplish nothing. The components of a projection system, from booth to screen, need to be designed to work together." Jacobson concurs with that approach and is moving toward a development of new standards. He explains, "The challenges of larger film images mandate not merely improvements to existing technologies but the development of new technologies. The public holds heightened expectations of the theatrical experience because they are part of an image-driven society. The superiority of the large film images will meet those expectations and establish new standards for our industry."

The Kodak bigscreen project will be in full swing for the next few months. Some of the factors being examined with regard to the well-lighted image are: the efficiency of lenses and shutters, even light distribution onscreen, improved xenon bulbs, heat reduction on the film, and alternative mirror design. Related issues that will be measured and evaluated include screen curvature and gain, seating geometry, use of colors in the auditorium, and reflective properties on port glass. Of course, holding focus is critical for very large images, even more so than smaller ones, because image size only exacerbates flutter and soft focus. The effects of magnification, heat, and lens focal length will be studied with an eye to making concrete recommendations for bigscreen applications.

Wayne Anderson of R/C Theatres in Maryland praises the trend toward big screens "as long as they are properly illuminated and in focus." He raises an interesting related issue, referring to the endorsements of the NATO Board of Directors and Technology Committee for the film format of choice for large screens to be 70mm. He mentions that those groups see that many of the problems of lighting 35mm film recede with the increased size on the image area of the film. *(See Pytlak's Projection Pointers)*

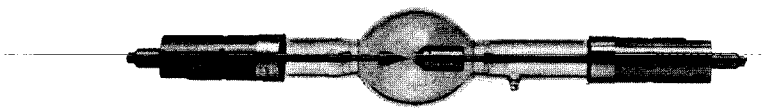
United Artists Theatres Projection and Sound Manager Bob Pinkston sees new hurdles for both manufacturers and exhibitors with the advent of more bigscreen construction. While cautioning about putting excessive strain on both the xenon bulbs and short focal-length lenses that exist today, he comments: "The new higher quality film stocks help with grain and brightness issues. But don't forget to look at the viewing angles as well as screen reflection angles during the design phase of the complex so that you provide the best overall presentation possible."

At Kodak, we are excited about the bigscreen project and eager to develop new criteria for making the motion picture experience more achievable in movie theatres. We welcome your input, comments, questions, and concerns. Please direct them to Terri Westhafer at the Kodak Hollywood office listed on the back cover of this publication.

BIGSCREEN *Guidelines*

Cinema Engineering Consultant Glenn Berggren offers the following chart as a guideline for large screens. Mr. Berggren sets forth these assumptions for his computations: 2.35 anamorphic 95mm lenses, accurate optical alignment of the lamphouse, shutter efficiency of 52-55%, curved screen positioned at 90-99% of the projection distance.

Screen Size & Area	Xenon Watts	Screen Gain	Center Light
14.25' x 34.2' (487 sq. ft.)	2000 W	1.5 to 1	16 ftL
15.8' x 38' (600 sq. ft.)	2500 W	1.5 to 1	16 ftL
17.4 'x 42' (731 sq. ft.)	3000 W	1.5 to 1	16 ftL
20' x 48' (960 sq. ft.)	4000 W	1.5 to 1	16 ftL
21.2' x 51' (1081 sq. ft.)	4500 W	1.5 to 1	16 ftL
25' x 60' (1500 sq. ft.)	4500 W	1.5 to 1	*11.5 ftL
27.1' x 65' (1761 sq. ft.)	4500 W	1.5 to 1	*9.8 ftL
29.2' x 70' (2044 sq. ft.)	4500 W	1.5 to 1	*8.5 ftL
32.5' x 78' (2535 sq. ft.)	4500 W	1.5 to 1	*6.8 ftL



Please Note: Neither Glenn Berggren nor the Eastman Kodak Company designates bulbs of specific wattages based solely upon screen size. A specially trained theatre technician should always be consulted when determining the appropriate wattage and amperage settings for xenon bulbs. The adequate illumination of large screens becomes a delicate balancing act due to the risk involved with permanent heat damage to the film. High-wattage bulbs should be used with care and only with proper heat-diffusing and cooling devices.

*The SMPTE standard for center light is 16 ftL. A primary goal of Kodak's *Operation Bigscreen* is the optimization of light without excessive heat on large screens.

Edwards Spectrum 21.

World's Largest Cinema Debuts In California

California-based Edwards Theatre Circuit, Inc, opened its "crown jewel": Irvine Spectrum 21, the largest theatre complex in the world, during the 1995 holiday season. Jim Edwards, the company's Chief Operating Officer, refers to the superstructure as "The Big One" with good reason: Its 6,400 seats and 15,000-square-foot lobby occupy 158,000 square feet in the high-tech Irvine Entertainment Center.

The new entertainment center has taken a fresh approach to the all-American shopping mall configuration. Rather than anchoring the complex with traditional retail merchants, the huge multiplex theatre is the focal point. Several major restaurants flank the Spectrum 21 as well as a large interactive video arcade and a multi-level bookstore. The developer combined the mix of movies and dining to appeal to the public's appetite for recreation and entertainment beyond the shopping-and-food-court mall environment.

The innovative concept most assuredly has been fruitful. The center outgrew its generous parking areas as soon as it opened. The theatre and its continual sell-outs on every screen headlined the Los Angeles TV news opening week-end. An additional 1,000 parking spaces will become available in March, but they are expected to fill quickly when Edwards adds yet another crowd-pleaser at that tine with a 500-seat IMAX 3-D venue at the same location.

Although the amenities of the 21-screen complex are almost too numerous to mention, its four premier auditoriums merit particular attention in the movie business. Commemorating the ambiance and glamour of the early movie houses, the Palace, Egyptian, Hollywood, and Chinese theatres each boast 600 custom seats facing 78-foot-wide screens. Two are designed with stadium seating and two utilize the more familiar gently-sloped floor. These impressive theatres are devised to showcase a motion picture in the grand, much larger-than-life style that gets audiences out of their homes and into the theatrical experience.

Side view of lobby. Edwards Spectrum 21.

A great deal of excitement is generated at the Spectrum 21 in the marble, brass and neon lobby in addition to what's going on in the auditoriums. The 100-foot main concession stand is surrounded with futuristic video walls. Seven additional concession stands boast everything from gourmet coffee and confectionary bins to nachos and pizza.

Edwards' Irvine Spectrum 21 and IMAX 3D is located at the interchange of the Santa Ana (5) and San Diego (405) freeways off Alton Parkway in Irvine, California.

Reardon Inter-Society Award Winner

D. Barry Reardon, President of Warner Brothers Distribution Corporation, is the recipient of this year's Ken Mason Inter-Society Award. The award is presented annually at the NATO/ShoWest convention to an individual who exemplifies dedication to the motion picture industry and its proliferation.

Mr. Reardon has been a leader in both the distribution and exhibition communities for nearly twenty years. He is a true innovator and proponent of new technologies intended to enhance the theatrical experience. Mr. Reardon, in partnership with the Inter-Society, NATO, and the MPAA, has championed the Extended-Length Reel (ELR) project and heartily advocated its industry-wide adoption. It is but one of his numerous efforts over the years to mutually benefit distribution, exhibition, and the movie-going experience.

The Inter-Society was founded in 1978 by Eastman Kodak Vice President Ken Mason for the purpose of facilitating dialogue among its members for the ongoing improvement of the motion picture industry. Charter members of the organization include NATO, MPAA, ACVL, TEA, and SMPTE. Current associate members are Eastman Kodak, The Technology Council, the American Society of Cinematographers, Technicolor Entertainment Services, Agfa, TAP/Lucasfilm, Dolby Labs, and the Motion Picture Association of Canada.

Pytlak's Projection Pointers Continued From Page 2

bulb higher than its rated current, using a "silver" mirror that reflects heat energy as well as light, and adjusting the lamp focus to a "hot spot". These three "Band-Aids" degrade the quality of the projected image, greatly shorten bulb life, and risk film damage.

By running the bulb well above its rated current, you are greatly shortening the bulb life, and likely voiding the bulb warranty. The likelihood of catastrophic failure (bulb explosion) is greatly increased.

Using a "silver" mirror increases the amount of infrared "heat" energy absorbed by the film. This heat increases focus instability, and may cause permanent physical damage to the film ranging from embossing to blistering or scorching. Black-and-white prints are especially likely to be damaged by excessive infrared energy. The silver image in these films absorbs more infrared than the dyes in color print film. Concentration of light at the center of the screen causes the sides and corners of the picture to be too dark. Standard SMPTE 196 specifies the screen luminance and light distribution for theatres. The luminance at the sides of the screen should be at least 75 percent of the luminance at the center, with a uniform distribution and no obvious "hot spot."

Your lamphouse does not have enough light output to illuminate such a large screen. You should consider using a larger lamphouse, having ample light to focus the bulb for optimum uniformity of illumination with no "hot spots." Efficient dichroic heat mirrors that eliminate most of the harmful infrared energy are mandatory, to avoid film damage and reduce focus flutter.

Other factors to consider are the projection lenses and the port glass. Lenses with multi-coated optics should be used. They are much more efficient than older designs, and can greatly improve the sharpness and contrast of the image. Port glass using optical glass with anti-reflection coatings will absorb less light and cause less flare.

Showing 70mm prints can improve the quality of the projected image, especially on a very large screen. The larger image area on the print provides many advantages. First, a longer focal length projection lens is used, giving greater depth of focus. So even if the film '"breathes", the focus shift is not as apparent. Second, the magnification is less, improving sharpness and graininess, and reducing the effect of projector unsteadiness. Finally, the image area on a 70mm frame is almost three times greater than on a 35mm anamorphic frame. So, the energy going through the film is spread over a much larger frame area, reducing the radiant heating of the film. Focus flutter and breathing are less common, and heat damage is much less likely.

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