Film-Tech

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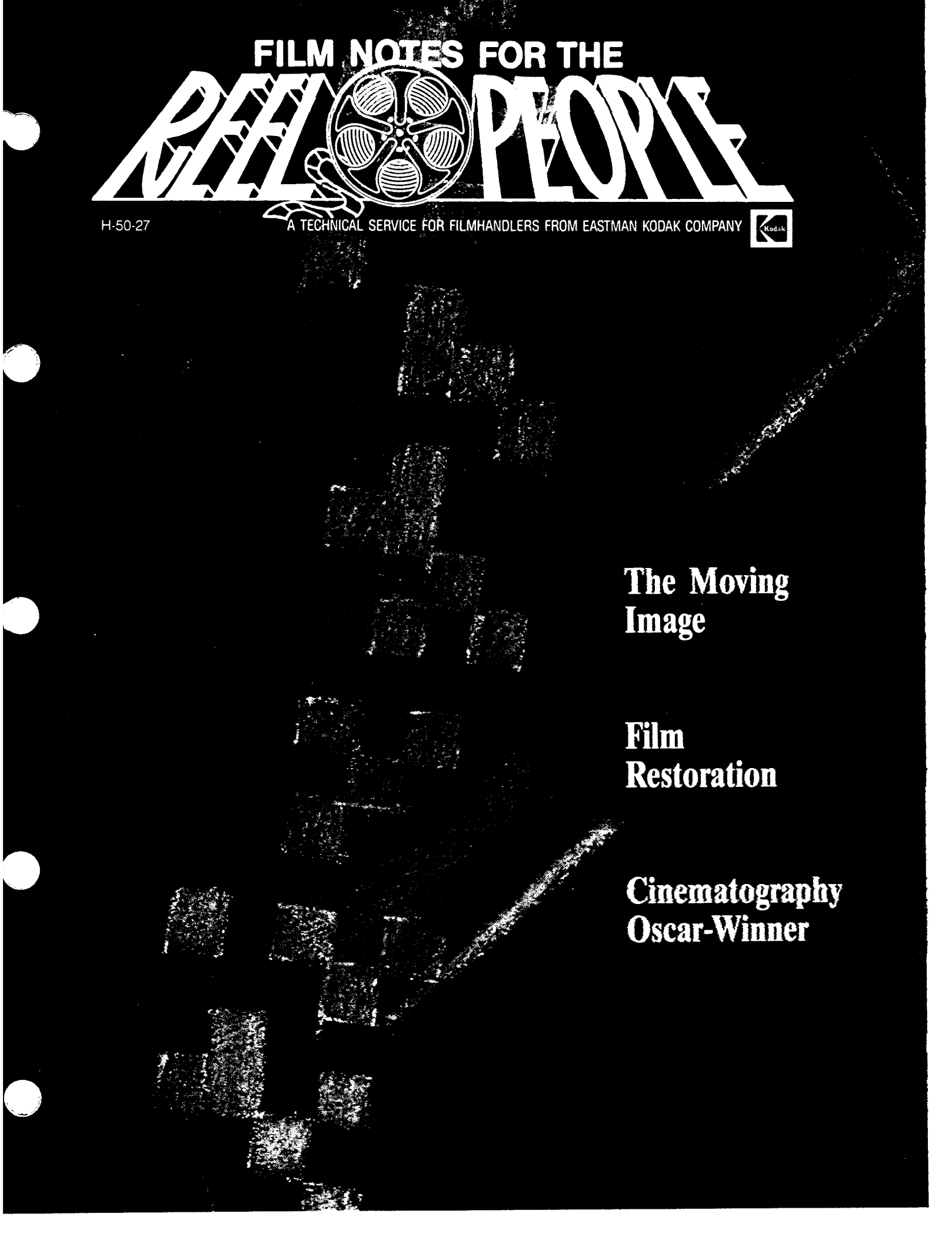
FILM NOTES FOR THE REEL PEOPLE

H-50-27

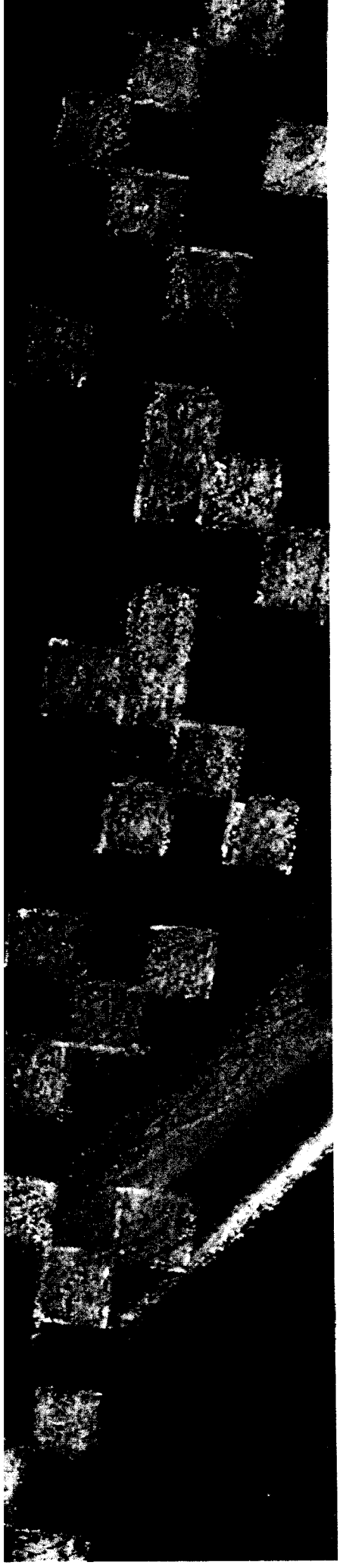
A TECHNICAL SERVICE FOR FILMHANDLERS FROM EASTMAN KODAK COMPANY



The Moving Image

Film Restoration

Cinematography Oscar-Winner



SUMMER 1991

FILM NOTES FOR THE REEL PEOPLE

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EDITOR'S MAILBOX

Editor's Note:
In 1937, Bud Christensen, at the age of eight, began working in theatres helping the doorman in his hometown theatre (Fremont, Nebraska). Mr. Christensen has experienced vast theatrical changes since then. For ShoWest 91, Cinema Digital Sound was installed in his theatre for demonstration purposes. He shared his comments with our editors:

"I've been fortunate to see many film technologies over the years. I was one of the first theatres to run 3-D in Nebraska. I've run Cinemascope, and I remember when stereo was introduced. But the digital technology is incredible. This is the first time I have heard split surrounds. The dialogue was so clear, and the sound, even though it got loud in places, was never irritating. There was definitely more separation than the Dolby system. The CDS system was easy to install, and the only thing that we had to do was replace a bad amplifier that had already needed to be changed.

"Probably what impressed me the most was the demonstration itself. Especially the sequence from *Batman* where Michael Keaton says "I'm Batman." When I saw *Batman* at the theatre, I could never really hear that line of dialogue very well. With the CDS system, that line was crystal clear, and it gave the scene impact. What CDS does for music is also wonderful. In *Edward Scissorhands* the music was beautiful, and once again, I was never bothered when the music got loud. Another powerful moment was the bell chime from *Rocky.*

"The ease and speed to install the system into our current Ultrastereo system makes it very feasible. The demonstrations were run by our two projectionists (Jim Visoki & Sherry Ward), who are both college students at UNLV. They were both really taken with the system as well. I sat through all of the demonstrations, and we didn't have a single problem. I guess my question would be, when do I get one of these systems permanently?"

Answer: *We are delighted that you so thoroughly enjoyed digital sound on film. We, too, find it sensational. Cinema Digital Sound is available in both 35 mm and 70 mm. Please contact Optical Radiation Corporation to arrange for purchase and installation in your theatre.*

Editor:

To receive a complimentary subscription to Film Notes for Reel People, *send your name and address to:* Heidi Brown, Film Notes for Reel People, Eastman Kodak Company, 343 State Street, Rochester, NY 14650

Kodak has a comprehensive projection manual as well. It sells for $35.00 in minimum lots of 10, or is available free of charge to all participants in the Film From Start to Finish *seminar. Please call Terri Smith or Brad Tierney for details (213) 464-6131.*

BOB HARRIS SPEAKS ABOUT FILM RESTORATION

BACKGROUND: Robert Harris is today's major force behind most of the current film restorations that have appeared on the big screen. His credits include Abel Gance's Napoleon*, *David Lean's* Lawrence of Arabia, *and Stanley Kubrick's* Spartacus. *Robert Harris' credits also include producing the critically acclaimed film* The Grifters. *He has dedicated a large portion of his time to locating lost films and materials for the American Film Institute, the Academy of Motion Picture Arts and Sciences, and other archives and studios.*

Q: What film materials do you need to begin a restoration? Realistically, what elements are already there?

A: That's really an open-ended question. We are lucky if the camera negative is in decent shape or if there is an interpositive or color separations. Each case is different and the amount of work required varies. If, for example, we only have a camera negative, we must virtually go through the entire process that you would for a new film. We would first make an interpositive from our camera negative and then an internegative. We may have to add or recreate opticals depending upon what we started with. We also have sound track considerations, and what condition they are in. Realistically, we may not be able to do good quality restorations if we don't have decent elements. With *Lawrence of Arabia* we had a worn camera negative, some 60 miles of trims and outs, a cut 35 mm interpositive, and a 65 mm interpositive with opticals. It took us almost 4 months *to create the restoration interpositive because the negative was in such bad shape. It is very tedious to compile old, brittle, and damaged materials.*

The only way to describe the restoration process is a labor of love, and we do emphasize "labor."

Q: What were the major problems associated with the film restoration of *Spartacus*?

A: The best way to answer this question is to give you the background about *Spartacus.* It was filmed in Super Technirama 70, which is a cross between Panavision Cinemascope and Vistavision, with the best and worst attributes of both. This was a 35 mm negative running horizontally through the camera (8 perforations wide) with a 1.5 squeeze. Therefore, it's an anamorphic image that can either be compressed an additional 50% to make a standard scope print, or can be unsqueezed to give you a 2.25:1 aspect ratio for making 70 mm prints. There were black and white color separations made (yellow/cyan/magenta) from the color negative. Unfortunately they were made improperly and didn't register, so we had to re-register every shot of the film. We had to develop a system to overlay each frame to match registration. There were other factors that fit into this equation as well, such as shrinkage of the film. We were not able to just set the different color separations into the machine and let them run. We had to line up each shot one by one and reshoot them. This is very labor-intensive. If there had been a good camera negative for *Spartacus* we would have the 182 minute version of the film. Then we could have run an interpositive, made an internegative, and then worried about working with the materials to add the additional footage.

Q: What changes were made to the original film as it was viewed in 1960?

* *working with Kevin Brownlow*

A: We were able to retrieve some missing footage that had been cut from the film due to censors in 1960. There is a scene with Laurence Olivier and Tony Curtis that has some underlying sexual overtones. We were able to get the images, but the sound had been lost. Tony Curtis came back into the sound studio to get his dialogue redone, but because we were not able to get Laurence Olivier's, we got the assistance of Anthony Hopkins who recreated the Olivier portion. We extended the ending, and added many other bits and pieces throughout the film.

Q: What ingredients did you bring into *Spartacus,* and what kinds of help did you get?

A: We received some original footage from private collectors as well as written materials from the University of Wisconsin. We were joined by Bob Lawrence, the original editor, who came back on board. Since Bob was there during the entire production and post-production process, it was incredible to have him on the project. He not only knew how the film had been put together, but also could help us figure out how it had been taken apart. Deluxe Laboratory dedicated its personnel to help us bring this classic back to the screen and loaned us one of their lenses. Stanley Kubrick, Kirk Douglas, Tony Curtis, Tony Hopkins, and more people at Universal than you can imagine made this restoration possible.

Q: What constitutes a film restoration, and why are we sometimes misled?

A: Quite often a film will be re-released, and is marketed as if restored. What normally occurs is that a new 70 mm film print is made, or quick and dirty intermediates are produced, and the resultant print is called a restoration.

Sometimes a "restoration" is actually more of a bastardization. Our goal is to go back to the most original surviving elements (sound and picture) to give not only the audience but the film's creators the quality that they deserve. This is especially true with a large-format film. We want to make the visual appearance of that film not only special, but an event. In some cases there are additional scenes put back into the film to enhance the story. These sequences may have been taken out for various reasons, quite often because of time constraints. Proof in point can be seen in *Spartacus* and in *Lawrence of Arabia.* To answer the second part of this question, we are sometimes misled in the advertising hype of the release. Sometimes you have to look to see if the film has been restored. There are many great films that we would like to see back on the screen. In some cases, it is not economical to restore them. I think it is important that all films be preserved for future generations, but for a studio to put in the resources (money, advertising) to bring back a classic, it must be profitable. The good part of this equation is that there are still many important films that fit in this category.

Q: What were the factors that helped make *Lawrence of Arabia* such a beautiful restoration?

A: *Lawrence* was shot on 65 mm negative, and Freddie Young had to over-expose it slightly because he wanted to get hot, hot desert sand, but not make it thin. He wanted the detail. There can be a misconception that if something is under- or over-exposed that it is done incorrectly. The fact that the

negative had been over-exposed, which gave it this rich color, and that the film had been stored properly at Columbia were two contributing factors that made the restoration possible. The camera negative had been run more than 225 times. (It had made 70mm prints, matrices, 35 mm IP's, and CRI's—it was warped, cracked and scratched on both the emulsion and base sides and the splices were falling apart.) We created new A&B rolls, we wet-gated it, and the result was that the Eastman negative that was almost 30 years old held up and knocked people right out of their seats. As a side note, Freddie Young started using Eastman stock back in the 1920's, and as far as I know, he is one of the few cinematographers that has worked in most of the film formats.

Q: How would you generalize the status of most film negatives from many of our classic films?

A: I don't know if you really want me to answer this question. There were a lot of misconceptions in the past pertaining to film storage. I think that most people would be shocked to know what has and is currently happening to some of their film properties. Unfortunately, sometimes it is too little, too late. If we are not careful and concerned about film preservation, we may find ourselves trying to restore current contemporary films. Original negatives must be checked often. In the past, the studios would make black-and-white color separations as protection masters. They were not always checked before storing them away. This process is still happening today. I have been encouraging the studios and independents to make color separations as soon as possible, then make a duplicate negative and a trial print from the dupe. The only company that I know of that is doing this is Amblin. What they found when they tested these separations from a fairly current release was that they ended up with a print that looked worse than a poor 16 mm blow-up, so now they are testing them. Had they vaulted them say for 30, 50, 70 years, and the original negative had deteriorated, they would have to depend on these separations.

Q: Do you enjoy working on epic films (*Spartacus, Lawrence of Arabia, Napoleon*)?

A: One of the reasons that I have been inclined to work on epic films is that not only do I like watching them, but they are the endangered species. If you take the normal film from the 50's or 60's, that negative may be fading, but it hasn't been run that much. They may have used it to do a few sets of matrices or dupes, so perhaps it's been used 9 times plus the dailies—maybe 15 or 20 times. Every time you run light through the negative you are fading it. The large format films—*Spartacus, Lawrence, Ben Hur*—however, were run many more times because there was not the best quality dupe stock for 65 mm negatives at the time. They would use the original camera negative to make 70 mm prints. Some of these original negatives have been run hundreds of times, and their life expectancy is dwindling.

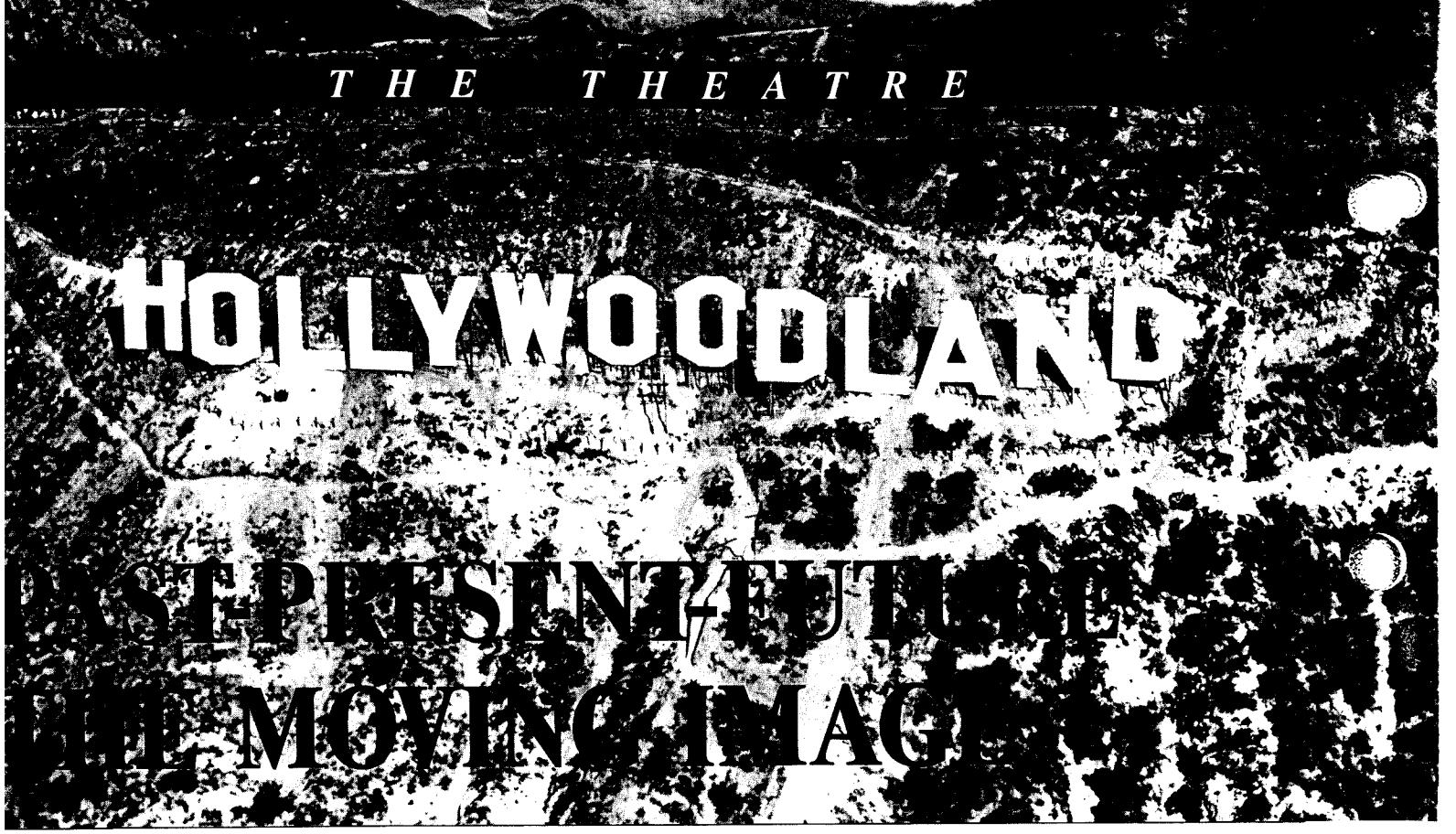
"I have been encouraging the studios and independents to make color separations as soon as possible, then make a duplicate negative and a trial print from the dupe."

Q: How many years will your restorations hold up before they begin to deteriorate?

A: Probably a hundred years if stored properly. That's a question that Kodak can answer better than I can (to be addressed in an upcoming issue). *Lawrence* is a good example. We made two 65 mm interpositives from the original camera negative. We also made a one-light interpositive from all of the new materials before we cut it. People might wonder how we hope to get 100 years out of this restoration when we couldn't get 30 years out of the original. One reason is that we are getting better film stocks to use in making interpositives and internegatives. There is also a movement within the industry to address the problems of film storage. We have a long way to go.

Q: What will help future restorations, and will T-grain films be a factor?

A: One way to help future restorations would be to get the studios to evaluate their films in storage. As time goes on, more and more films will be lost to us. There should also be a good set of B/W color separations made as insurance. We would not have been able to restore *Spartacus* without them. The use of T-grain films will allow us to dupe so many more generations. I've been told that to make T-grain film look bad you have to work at it, because there is so much shadow detail. I tried to make *Spartacus* look like dye-transfer Technicolor with all the dupes produced at high contrasts. We are very pleased with the results.



Toward the end of 1892, Thomas Edison built the first movie studio, "The Black Maria," and the following year he started producing films.

Within a few short years, the moving image changed from a solitary endeavor—one person peering through a peephole—to a shared social experience. The first theatre opened in New York City on April 23, 1896, at Koster & Bial's Music Hall, located at 34th Street and Broadway. Movies were shown with a Vitascope projector made by C. Francis Jenkins and Thomas Arnat, who contracted to promote it under Edison's name.

"After World War II, television made its long-promised debut, and it brought free entertainment into most households."

A number of peepshow projectors were built in England by W.R. Paul, who noticed that Edison had failed to file a patent application in that country. Paul, in association with Birt Acres, England's first cinematographer, commenced producing short features to be included in the bill of fare for the early theatres. One of his films focused on the German emperor reviewing his troops, and the other was entitled *A Rough Sea at Dover.*

A drama critic for a local newspaper reported enthusiastically on the experience shared by an audience of strangers sitting in a darkened theatre, watching moving images on a screen. During the screening of *A Rough Sea at Dover,* the critic noted that people sitting in front rows were ready to jump out of the way in case the waves came too close. It was probably the first critical rave earned by a cameraman. It was also the first day in the life of a new art form.

The First 'Talking' Pictures

Edison made "talking" pictures from 1912 to 1914. But they failed to become mainstream entertainment, possibly because much of the movie-going public consisted of immigrants who didn't speak English. By the 1920's the studios were experimenting with color, wide-screen displays and sound. They were also building "palace" theatres, which were often a community's architectural centerpiece.

At the end of the decade, silent films were outdated, but the economic depression of the '30s slowed down advances in color technology and put experiments with wide-screen formats into a holding pattern for a several-decade hiatus.

After World War II, television made its long-promised debut, and it brought free entertainment into most households. Meanwhile, Hollywood's constituency was moving away from the cities, where the palaces were located, and into the suburbs. Box office admissions went into a steep decline.

Hollywood's impresarios searched for a technological solution. They thought they had it with 3-D. There were 100 or so films made in the 3-D format between 1952 and 1954. Every studio was riding the bandwagon. But few of their films were released

in 3-D format.

Why? The public wasn't interested in the stories that could be told within the limitations imposed by 3-D production technology. But they *did* like color films, wide-screen formats, and better sound.

Those breakthroughs in technology, plus more comfortable theatres located where people lived and multiple screens providing for individual tastes, brought audiences back to the movies.

The U.S. movie industry stabilized in 1965. For the past 25 years, the number of box office admissions has held consistently between 1 billion and 1.2 billion.

A Picture of the Dynamic '80's

The 1980's were a great decade for movies. By 1989, there were some 90,000 theatres with just a little more than a quarter of them in the United States. There were some 14 billion admissions that year with 1.12 billion of them in the U.S.

During the '80s, domestic box office revenues increased by 80 percent, going from $2.75 billion in 1980 to more than $5 billion in 1989, an all-time high. There were approximately one hundred million more box office admissions in 1989 than in 1980. In addition, the number of domestic screens increased by 30 percent, going from 17,675 in 1980 to 23,132 in 1989.

It was more of a mixed picture in worldwide markets during the '80's, with ticket sales declining in some Asian and European markets. Overall, the number of screens and admissions has held steady since 1983. In the United Kingdom, where the multiplex concept is now becoming entrenched, admissions are increasing at a vigorous pace. The U.K. box office had 20 percent more admissions in 1989 than in 1984.

Multiplexes have been opening up in suburban Japan and Australia with good results. The Kinepolis, in Brussels, was the most ambitious multiplex project of the '80's with 26 screens, 7,500 seats and 15,000 parking spaces. "Multiplex Fever" also runs high in Germany. Cinnemaxx, with 10 screens and 3,200 seats, opened in Hannover in January, 1991. Other large multiplex projects are underway in Cologne, Bochum, and Munich.

U.S. Films Rate High

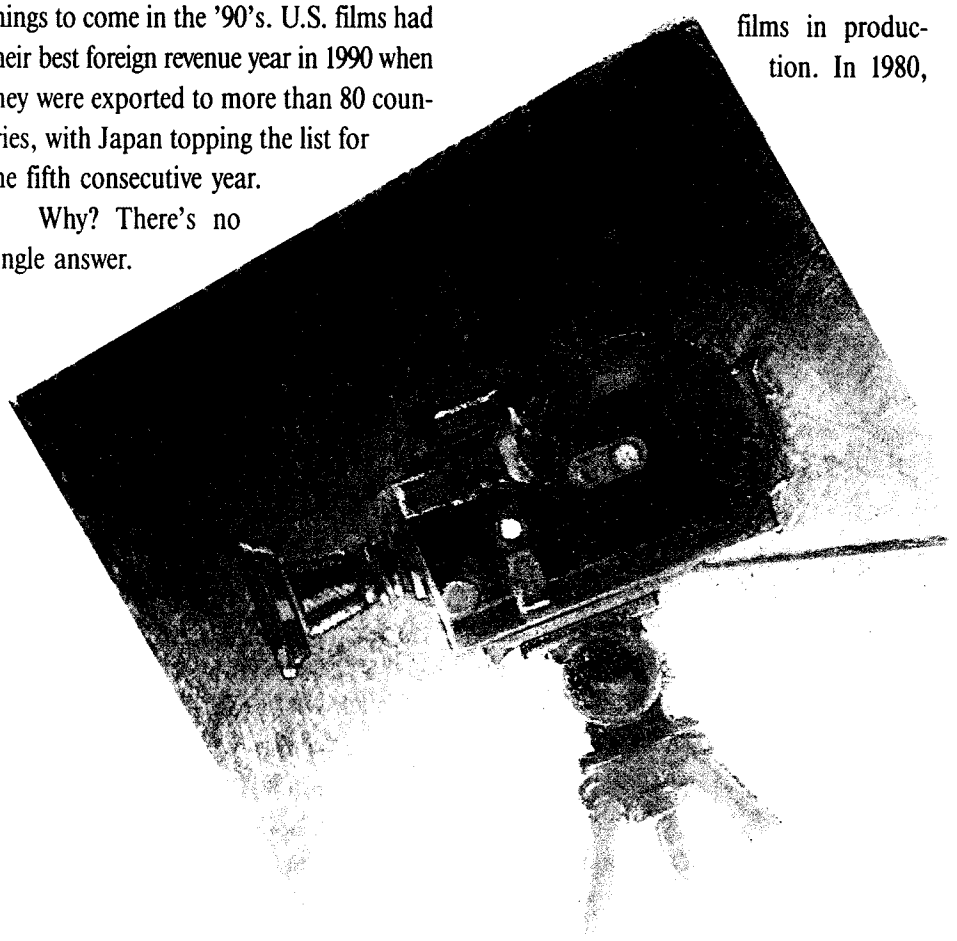
What are audiences watching? There were some 3,800 feature films produced worldwide last year. A little under 10 percent—331—were made by U.S. filmmakers. The U.S. films accounted for about 70 percent of worldwide box office revenues. But that may be just the prelude of good things to come in the '90's. U.S. films had their best foreign revenue year in 1990 when they were exported to more than 80 countries, with Japan topping the list for the fifth consecutive year.

Why? There's no single answer.

Large numbers of English-speaking people around the world go to movies. People in many overseas markets are more willing to watch foreign language films with voice dubbed, or titles, than their counterparts in the U.S.

American producers generally deal more in international themes, and they cast stars with worldwide box office appeal. Another major factor: Hollywood makes great movies with terrific entertainment and production values. In fact, Hollywood has come to mean more than a place on the map. It has become an idiom for good filmmaking.

These trends have had a direct impact on the number of films in production. In 1980,



U.S. filmmakers turned out 197 titles. Last year, the number of feature film releases (compared to 1980) was up by almost 70 percent. Overseas box office revenues surged by 60 percent during a five-year period ending in 1989, with another 10 percent increase for 1990.

Selling Film in Ancillary Markets

One of the big lessons of the '80's is that success at the box office is the driving force behind home video and televised feature films. It is a simple equation: You have to hit a home run at the theatre in order to score in the VCR/laser disc and television arenas.

These electronic aftermarkets provide major profit centers for feature film producers. And they mandate a wide variety of programming, thereby encouraging diversified creativity that appeals to wider sectors of the movie-going public. This all adds up to a very vigorous feature film industry. Earnings from theatrical features jumped from $5.2 billion in 1984 to $13.1 billion last year. Entertainment analysts project that U.S. feature films will be a $19 billion business by 1994.

And the prolific theatrical film releases paint a very bright picture in the ancillary markets as well. In 1989, more than $5 billion in revenues for U.S. feature films came from home video (cassette and laser disc) rentals and sales. The television and cable markets continue to flourish. In 1984, worldwide television accounted for about 26 percent of revenues earned by the U.S. movies. Last year, it was 46 percent.

Riding the Film Roller Coaster

If you have ever ridden the roller coaster or space ride at Showscan or Iwerks Entertainment theatre, you should readily understand that simulated rides are becoming the ultimate experience at theme parks around the world.

You are sitting in a darkened theatre with 70 mm images covering the entire screen from wall to wall and ceiling to floor, at either 30 (Iwerks) or 60 (Showscan) frames per second. The seat is swaying on hydraulic controls in perfect synchronization with the twists, turns and dips depicted in the moving images on the screen. Six discrete channels of completely realistic digital sound are coming at you from all directions. Everyone else in the audience is screaming and laughing. You'll be gripping anything you can reach and hanging on for dear life! Watch the same ride on television at home, and it's likely that the only thing you will reach for is the channel selector.

"Erland points out that the change to 6,000 foot reels would greatly reduce the handling and splicing of film and thus minimize screen distractions."

However, there may be more involved than the screen size and image and sound quality. Kim Foley, a researcher at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts, looked into the differences between the way film and video images are perceived. Foley conducted tests with two audiences. One group was made up of media experts. The other group consisted of individuals with no specialized media expertise.

Both groups were shown a series of 30-second clips taken from feature films, TV programs, news, commercials, music videos, and various other sources. The audiences were asked whether they were looking at film or video-originated programming. They also were shown tapes of parallel scenes shot side-by-side with film and video cameras and they were asked what, if any, differences they observed.

Large majorities of both audiences were able to discern film from tape-originated images. They used words like "lush," "moody," "rich" and "liquid" to describe the film look.

Foley concluded that tape has a here-and-now feel, while film is removed, a fantasy that suggests a dream-like state. Audiences perceive video as the information medium, and film as the entertainment medium. In answering a separate question, 85 percent of both groups said they preferred going to movies as compared to watching television. People *want* to go to the movies. They just need a reason.

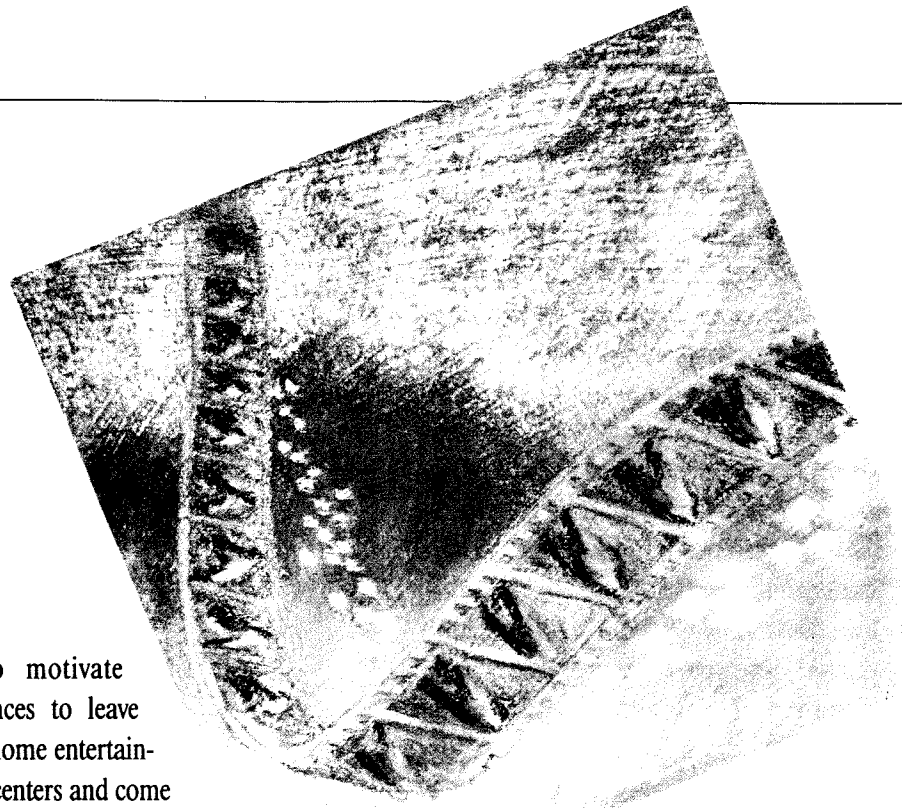
Outlook for Theatres in the '90's

Industry analysts anticipate that the number of theatrical screens overseas will increase by one to two percent annually throughout the '90's, while the U.S. is likely to remain at or near its current level. It may not sound ponderous when expressed in that manner, but it adds up to at least 10,000 new screens by the end of the decade. That would bring the worldwide total to more than 100,000 screens.

But competition from home video will get sharper. The laser disc player, which is now gaining increasing acceptance as an alternative to VCR's, already delivers better sound than many theatres, and the quality of the image is a marked improvement over video cassettes. There will be other major improvements in television image and sound quality.

Even so, Richard W. Cook, president of Buena Vista Pictures Distribution, Inc., believes the '90s could bring a period of dynamic growth in theatrical admissions mainly because of the talent he sees emerging in the creative filmmaking community.

But he cautions that exhibitors will have to ask themselves what they need to



do to motivate audiences to leave their home entertainment centers and come to the theatre. It is going to require a superior experience with bigger screens, better sound and brighter, sharper projection.

Better lenses and brighter lamphouses are needed in many theatres which simply do not put enough light on the screen to accurately render all of the production values that current movies have to offer.

Better ways of controlling dust and dirt on the film continue to be sought. To this end, Kodak engineers have developed a simple, solvent-free device known as a Particle Transfer Roller (PTR). The PTR has a tacky surface that picks particles off the film as it runs through a projector before the frames reach the gate. This could prove to be an extremely effective method for improving presentation quality.

The Technology Foundation of the Motion Picture and Television Industry is a newly-organized multi-discipline group based in Hollywood. They have formed a technology council with some 60 members on the board of directors, representing broad-based segments of the worldwide motion picture industry.

Frank Reinking, president pro tem of the Foundation, says the purposes are to build an industry-wide database, maintain a research center and information exchange, and create new systems and protocols. The group will also research and develop new procedures, products, and methods that will benefit the entertainment film and broadcasting industries.

"Prints made from this enhanced electronic intermediate would, in effect, be first-generation quality."

Jon Erland, director of research and development for Apogee, and one of the founders of the technology council, says the first funded project is an investigation of the feasibility of switching film delivery modes to theatres from 2,000 to 6,000 foot reels. Currently, theatre personnel have to splice film together from the 2,000 foot reels to fit on the platters used in most modern projection booths. Then, at the end of the run, the 2,000 foot reels have to be decoupled. This tends to lead to more dirt and scratches occurring on the release prints.

Erland points out that the change to 6,000 foot reels would greatly reduce the handling and splicing of film and thus minimize screen distractions.

He admits that there is no quick and easy way to bring about this change. But it does serve as a reasonable example of a low-tech solution that enhances the movie-going experience. The Foundation also is investigating the development of a solvent-free film cleaning process (PTR technology meets these needs) and exploring various ecological issues relating to the film and television industries. Education is a major concern of the Foundation.

Improvements in Film

One issue in today's movie industry is that a fair amount of the image information that current camera films are capable of capturing never makes it to the theatrical screen. An interpositive is made from the camera negative. Then, an internegative is made from the interpositive for release printing. At each step, some of the sparkling quality of visual information captured on the original negative is lost. That's the *reality* of working in any multi-staged analog imaging system, film or video.

Carl F. Holtz, Kodak's Manager for Motion Picture Development, says there is considerable room for improvement. Film designers are still in the early stages of developing the full potential of the patented T-Grain emulsion that's at the heart of the new Eastman EXR negative films. It's highly likely these advances will lead to improvements in intermediate and print films, as well as in the camera films.

"We're exploring all avenues of approach," says Holtz. "The ultimate goal is to refine the film system to the point where release prints are much closer to the quality of direct prints from the original

negative. If you combine that with improvements in the way print film is handled and projected by exhibitors, we can make dramatic improvements in the image quality presented to audiences."

That's the short term solution. In the longer-term, a high resolution electronic intermediate system for motion pictures could produce duplicate negatives which exceed the screen quality of a direct print from the original negative. With this scenario, image information on the original would be scanned into digital format for image processing.

This would be achieved without any degradation of image quality. All of the subtle details in shades of contrast, the manipulation of granularity and colors, would be represented on the digital intermediate. At this stage any anomalies, such as dirt or scratches on the negative, could be digitally retouched by the computer. There would be an opportunity for image enhancement, which could include reduction in grain, where that is appropriate for the look of the film.

"For the first time, the sound department will be able to manipulate the tonal range of the audio track to evoke emotional responses with the same element of subtlety that has been available to cinematographers.

"Prints made from this enhanced electronic intermediate would, in effect, be first-generation quality," Holtz points out.

"The technology is evolving very quickly," he says. "It's going to come down to a matter of costs. At what point will the cost of storing and processing the literally billions of bits of visual information that make up a motion picture feature be low enough to justify the gains? It's going to happen; the only question is when. But that should be our goal. We shouldn't settle for any common denominator which is less than the ultimate image quality stored in the camera negative itself."

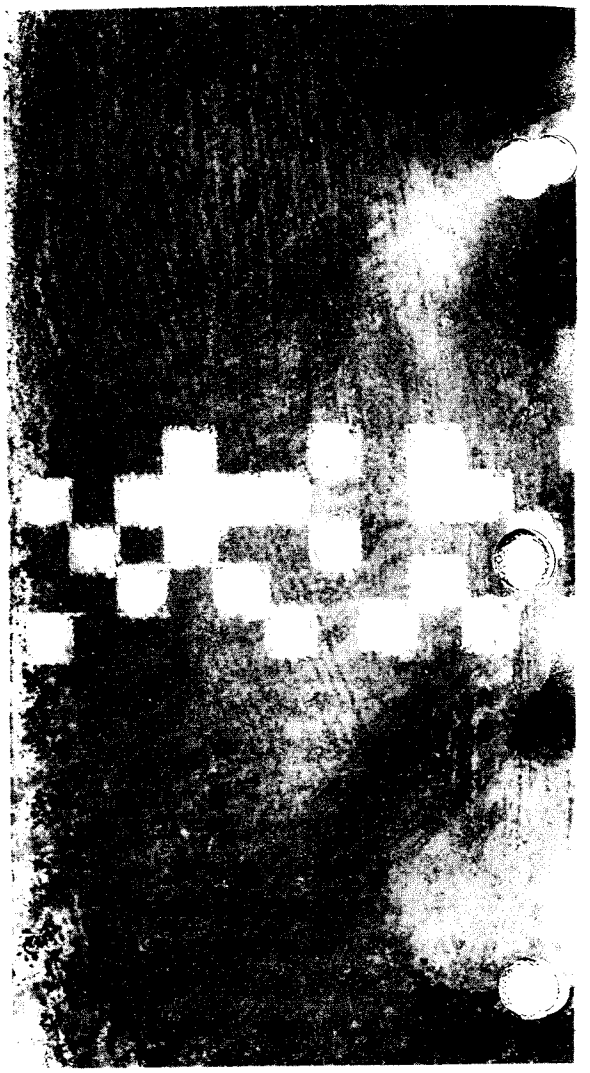
A New Kind of Sound for Theatres

There's another dimension to the movie-going experience: sound. Last summer, Kodak and Optical Radiation Corporation introduced Cinema Digital Sound, which had its debut in selected 70 mm theatres with *Dick Tracy.* This milestone in sound achievement is now available in 35 mm as well. To date, Cinema Digital Sound has enhanced a number of major motion pictures, the most recent of which has been the record-breaking *Terminator 2.*

CDS provides six discrete channels of crystal clear audio which surrounds the audience with dialogue, effects and music. Five are full-bandwidth channels capable of discerning, from the softest to the loudest sounds. A sixth sub-woofer channel carries the deepest bass tones.

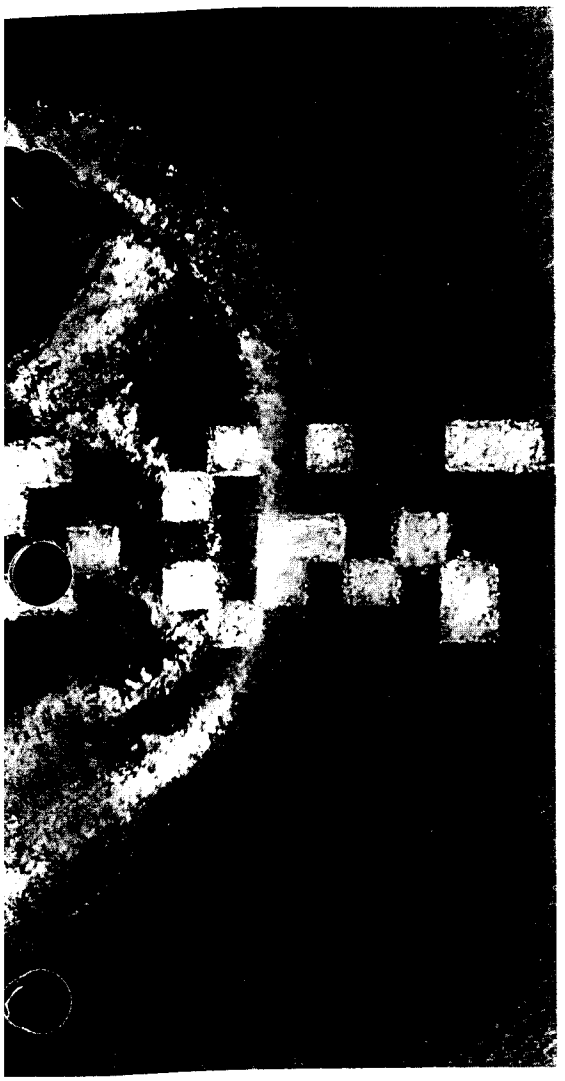
Filmmakers can place and move sound anywhere in the theatre. Furthermore, they will have complete freedom in separating sounds coming from different channels. For the first time, the sound department will be able to manipulate the tonal range of the audio track to evoke emotional responses with the same element of subtlety that has been available to cinematographers.

And in filming, audiences will hear the difference. Digital sound is clear and crisp, and free of noise and anomalies characteristic of analog sound. The digital track is printed optically on the film. It won't wear out or deteriorate during the run of the film. An error detection and correction system is built into the digital-to-analog processor. This ensures that the last audience to hear a movie enjoys exactly the same experience as the first.



Now that audiences can hear the quality of digital sound in theatres, expect more use of DAT and other digital audio tape recorders during production. As screenwriters and directors realize the dramatic implications of being able to move and locate digital sound any place in the theatre, anticipate closer collaboration between cinematographers and audio departments.

Theatre owners with facilities already equipped with high-quality surround sound speakers have to do only two things to gear up for CDS: Install a digital decoder on the projector, and install a digital sound processor in the equipment rack. The latter decodes, or unpacks, the stream of digital data on film and translates it to sound.



Alternative Theatrical Experiences

The electronic theatre is one often-mentioned alternative for the '90s and beyond. With this scenario, movies would be originated electronically or transferred from film to tape. Movies would be distributed by satellite. The theatre would need a satellite dish and a videotape recorder to capture and store images and sound for playback at scheduled times. A high quality video projector would be used in the theatre.

"What about the movie-going experience? Would it be the same or different in an electronic theatre?"

Proponents see two main advantages. One is the elimination of costs for making and distributing release prints. The other is that theatres equipped for satellite reception could offer alternate programming to movies, such as sporting events, plays from the theatres of New York and London, and concerts.

The Club Theatre Network in Florida is already testing the concept. They are using a Rank-Cintel Mark III HD telecine to convert movies to high-definition tape for electronic projection in boutique-style theatres.

It's difficult to predict the impact of electronic theatres from the limited data available. With current high quality video projection, satellite and recorder costs, the price of outfitting a single screen could range from $250,000 to $800,000, depending on the size of the screen and the image quality desired. A smaller club would probably try to get by with a smaller capital investment.

Unknown cost factors include film-to-HDTV transfers, operation and maintenance of projection equipment and satellite distribution. In contrast, it currently costs approximately $2,000 to purchase a 35 mm release print of a theatrical feature. There are additional costs for distributing and warehousing prints. But the same print is likely to be used by more than one theatre.

As an alternative to satellite delivery of programming, videotapes of movies could be distributed to theatres. This would require advances in tape-duplicating technology for mass-producing tape prints along with major capital investment in facilities and equipment for duping. Costs for distribution and warehousing would be the same as for film. It would be possible, however, to erase and recycle tapes a number of times before they would have to be replaced.

Given these facts, how long would it take for an exhibitor to recover the cost of outfitting an electronic theatre? At current price levels, the answer is probably around ten years. That equation could change if there is a dramatic drop in the cost of high-quality electronic projection systems.

"There are other aspects of the 'film look' which distinguish it from electronic projection, such as screen brightness and dynamic range."

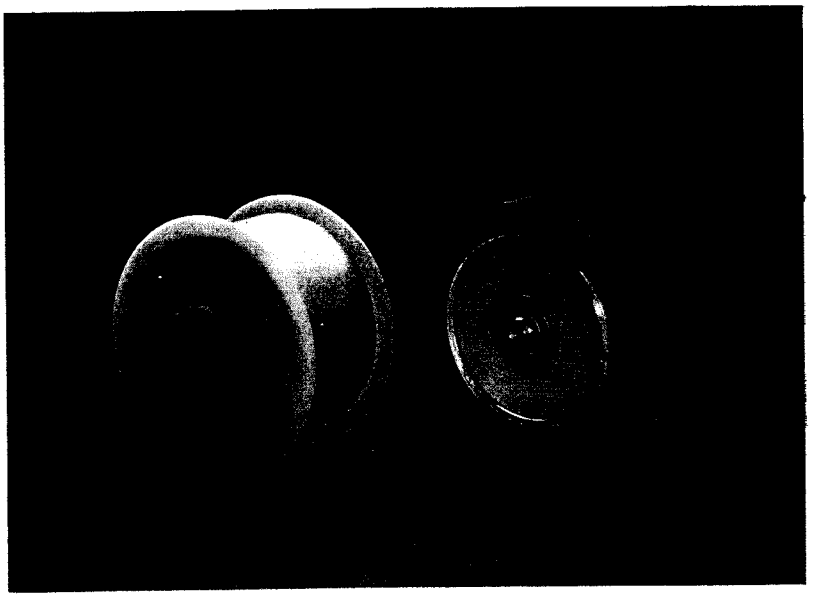
What about the movie-going experience? Would it be the same or different in an electronic theatre? There are those who believe it would be the same based on measuring lines of resolution projected on the screen. That can vary greatly among theatres, however, depending upon size of auditorium and screen as well as projection throw and other factors.

And that's just resolution. There are other aspects of the "film look" which distinguish it from electronic projection, such as screen brightness and dynamic range. Can those imaging characteristics of 35 mm film be emulated in an electronic theatre? That question is still unanswered. No one expects electronic projection technology to mirror 70 mm print image quality in the foreseeable future.

Prognosis: The ability to schedule live or time-delayed sporting events, concerts or plays is a new business that some entrepreneurs are going to explore. There is some interest in opening boutique electronic theatres in areas where real estate costs are very high. Expect some electronic theatres during the '90s. But don't expect a mass exodus from film to electronic theatres in this decade. Chances are that the movie-going experience will improve, and that there will be more film theatres at the end of the decade rather than less.

PARTICLE TRANSFER TECHNOLOGY

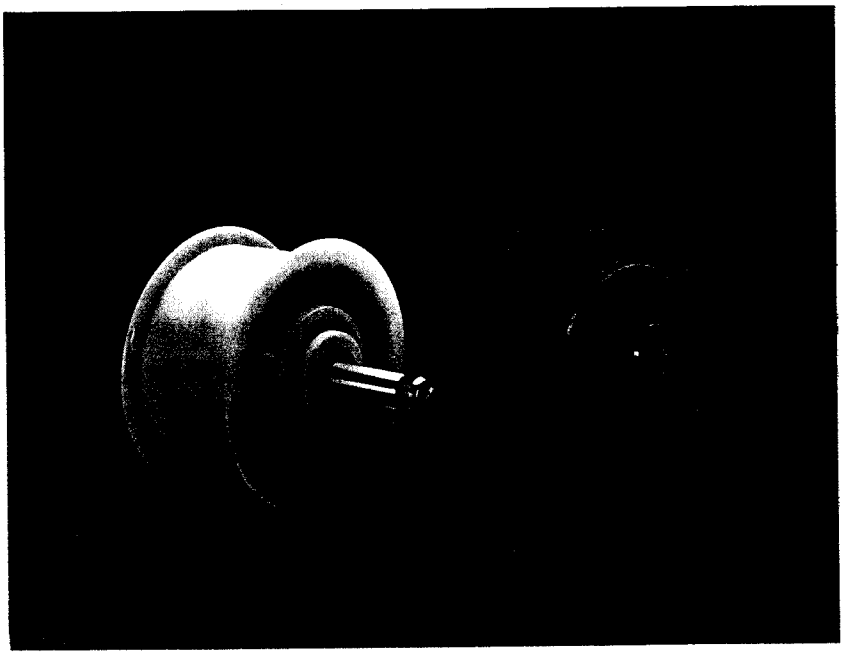
(The Perfect answer to your Particle Problem)

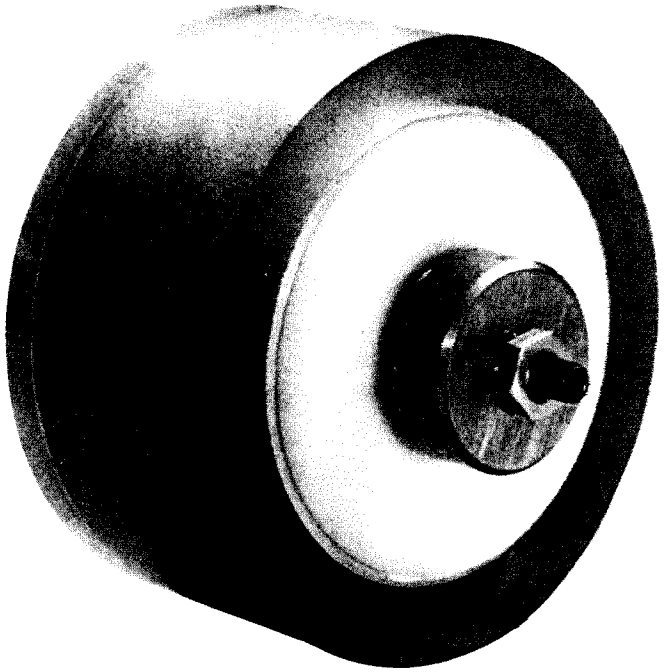


■ They're called the **PTR-Particle Transfer Roller** and the **PTB-Particle Transfer Belt.** They're made from a newly developed material that picks up dirt, dust, hair and other unwanted particles from film, video tape, and other smooth, continuous web surfaces.

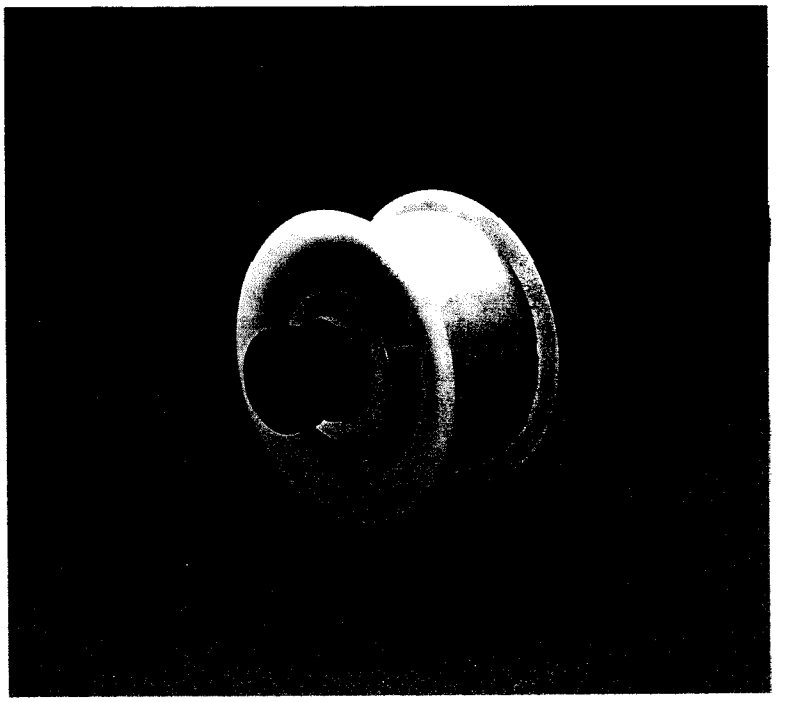
They have a 95% average cleaning efficiency, pick up particles as tiny as 10 micrometers in diameter, and are extraordinarily durable: after cleaning more than 6 million feet of motion picture film, the test rollers are still going strong.

■ The **PTR/PTB's** are very easy to clean: just wash them with water, wipe them with a damp sponge or daub them with sticky tape. They replace liquid solvent cleaners, and are easy to install at a very low cost.





■ Particle transfer technology has been proven highly effective in film cleaning units used on theatrical motion picture projectors. The **Particle Transfer Belts-PTBs** are mounted on specially designed flanged rollers which can be added to the film path or replace current rollers within your platter projection system. Available with 3/8″ ID water proof bearings in 35mm and 70mm widths, they are lightweight, and completely submersible for cleaning.



■ Particle transfer technology is also being used for other specialized needs (Telecine, special looped systems, labs, 16mm, etc.). Mounting shafts and spindles as well as specialized cleaning devices are also available.

For information about **PTRs** or **PTBs** please contact:
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DEAN SEMLER'S OSCAR "DANCES"

NOTE: Dean Semler was awarded the Oscar for Best Cinematography for Dances With Wolves.

It was love at first sight when (producer) Jim Wilson and Kevin Costner asked Dean Semler, ACS, to read Michael Blake's script for *Dances With Wolves.*

What a romance it was: Twenty-two weeks at practical locations in South Dakota, shooting mainly on vast, open plains. In the summer, the days were sun-baked with temperatures rising above 100 degrees Fahrenheit. By the time the last frame of film was exposed, it was bitterly cold, minus 20 to 30 degrees Fahrenheit. Snow was falling in the mountains, where the winter camp sequence was filmed.

Dances With Wolves chronicles Lt. John Dunbar's journey to the outer boundaries of the American frontier and his embrace of native American values. It also dramatizes a classic clash of cultures, and concludes with the cavalry cutting through some of the last free Indians like a scythe through wheat.

Semler puts the audience in the middle of a stampede of a thundering herd of buffalo; he makes them feel the vastness of the Far West plains; and he brings them into intimate contact with Ten Bears, Kicking Bird and other native Americans who start out as menacing characters and become admired friends as the film progresses.

Around half of *Dances With Wolves* was shot during nine weeks in and around Pierre, South Dakota, including a Civil War battle scene set in Kentucky, the Fort Sedgewick sequence, and all of the footage with the buffalo. There were 13 weeks of production around Rapid City, South Dakota, where most of the major Indian camp and winter camp scenes were filmed.

"We had beautiful seasonal changes, which we managed to use, including three or four days of snow," Semler recalls. "Early in production, the sun was hitting my window at 5 a.m., and we were able to shoot until 9:45 at night before we lost daylight. During the winter, we lost the sun by 4:15-4:30."

Part of his preparation consisted of looking at pictures in a book from the period, which was around 1870. But that was just preliminary background.

"Kevin had a very strong vision, and what you see on the screen is exactly what he wanted to shoot," Semler says. "He was very passionate about being true to the story. We shot everything in the script. It took between 700,000 and 800,000 feet of film. The first cut was six hours. The final film was three hours."

There was some early discussion about format. Costner wanted an intimate story, and that usually suggests the 1:85 aspect ratio, which is also more compatible with television.

"We looked at some movies made in anamorphic format, and shot some tests near the buffalo ranch in South Dakota," Semler recalls. "Once we saw the dailies, it was obvious that the wider scope added something to the picture."

Semler also spoke about shooting a wardrobe and makeup test in an empty store in Pierre. He used a small wind machine and lit the lead characters while Costner was posing them at various angles.

"Part of the power of Dances With Wolves *is the absence of visual cliches. The camerawork is always transparent and unobtrusive."*

"Later, when we looked at dailies, Kevin had background music playing," Semler recounts. "It was the culmination of a great deal of preparation, the script, brilliant casting, wardrobe and makeup. People were actually crying. I think everyone involved felt we were about to embark on a unique experience."

The look Costner wanted from Semler could be summed up in a word: honest. It was clean and unfiltered. Part of the power of *Dances With Wolves* is the absence of visual cliches. The camerawork is always transparent and unobtrusive.

"We photographed the look that nature and natural light provided," says Semler. "Kevin also was very much into sound and music. He said that if the images started to slide off the screen, the music would hold them back."

In one scene, Dunbar found a wounded Stands With a Fist (played by stage actress Mary McDonnell) sitting under a tree. It was a magic day. The leaves had just turned golden. It was a natural setting for the beginning of a romance. But, there was a sudden frost that night. The next day, the leaves were gone. No problem. The art department had bags of leaves shipped from the East Coast, and they stuck them on the bare branches of the trees for shooting over the next weeks.

There was very little use of primary colors in *Dances With Wolves.* Mainly, the film has the look of autumn with fairly muted tones. Even the wind plays a part. You can literally feel its power as it howls through the plains, with the grass waving, and trees and brushes bending in its path.

It was the first major use of Eastman EXR color negative film 5245, a 50-speed, daylight-balanced film with a pristine grain structure. Semler's original thought was to use this film for all daylight exteriors. It's a natural canvas for recording images that capture the feeling of vastness on the open plains. There are scenes where you can see miles of waving grass framed by rich blue skies.

However, he decided to blend it in many sequences with the high-speed 5296 EXR film, which was used for night and interior scenes. This film is rated for an exposure index of 500 in 3200 K light. However, Semler exposed it at E.I. 250 in daylight with a number 85 or 81 EF color-correcting filter on the lens to take some of the blue light out.

Sometimes he used the 5296 film to finish a scene while chasing the last remnants of sunlight on the horizon. Another scene: There's a long shot of Indians on horseback riding toward the camera. They are spread across the plain a half a dozen or more ranks deep. Everyone is in sharp focus because Semler is working at Stop T-22 or more. No one has to hit a mark to stay in focus.

Semler made good use of two new anamorphic lenses from Panavision, a 200 mm macro, and a 250 mm macro lens. That enabled first assistant Lee Blasingame to pull crisp focus down to one or two feet. With normal anamorphic lenses, minimum focus is rarely less than four to five feet.

Because of the good minimum focus and aperture of around 2.8, these lenses were used for most of the close interior type of work.

There was a stunning night exterior, in the Indian camp, that was actually shot at twilight, where Dunbar danced around the fire. A Musco light was positioned to simulate moonlight. It lit the background. However, the main keylight came from the fire itself, augmented by flicker bricks provided by the special effects crew.

In this situation, Semler rated the 5296 film at E.I. 320, shooting without a filter, with a moderately long lens at stop T-2.8. Semler shot this sequence at speed, 48 frames per second, which extended the action and added a dream-like quality to the images on the screen.

Because of the cold or rainy weather, some of the night work in the Indian camp was shot on a set built in a quonset hut. Some of this was close-in work, but there was also mid-to-wide angle coverage that blended seamlessly with exterior footage.

The interior of the biggest tepee was only 22 feet in diameter at ground level. Coverage ranged up to 200 degrees. Semler lit from two opposing directions, very high and very low. He had two layers of diffusion at the top of the tepee, about two feet apart. He hit these with blue HMI light from above. This provided very soft light just at the top of the head. On the floor, he had a fire augmented with red light from flicker boxes placed inauspiciously around the edges of the flame.

"Cinematography is a very individual thing," Semler says. "Everyone does it differently. It's a gut reaction. I have to look through the lens to see how the actors are framed, where the light is falling and how the backgrounds look. Quite often on

Dances With Wolves, I changed the stop at the moment of photography. I did a lot of fine tuning between takes."

There were only two matte shots, and these involved the discovery of the herd of buffalo. There was some 2,000 of the animals in the herd used for filming. Optical composites were used to create the illusion of the herd being much larger, 50,000 to 100,000 buffalo, in order to be true to the story.

"We couldn't use a conventional tracking vehicle, because we had no idea of where the herd would run."

The buffalo hunt idea was to channel a stampeding herd of 2,000 buffalo down a valley through a predictable route by driving them from the rear with helicopters and pickup trucks. It was impossible to use fences or people at the edges of the scene because of the wide angle of view. There were 18 to 20 Indians riding bareback, with no hands, in the middle of the herd, firing arrows. Costner was on his horse, also riding with no hands, firing his rifle in the middle of the action.

There were nine cameras, with perfectly matched lenses, mainly in fixed locations, behind vans and trucks. A Steadicam was mounted on the back of a pickup truck. The operator, Jimmy Muro, was harnessed securely to the bed of the truck which was specially equipped with rollbars for safety purposes.

"We couldn't use a conventional tracking vehicle, because we had no idea of where the herd would run," Semler says. "They were riding over unplotted terrain with bushes and trees, ridges and holes in the ground, and little creeks."

There was a second pickup truck standing by. Semler decided to use that to get close-up footage of the buffalo. He covered himself in heavy pads for protection, and was tied safely to the truckbed. He held the camera with one hand down at near ground level. A canvas wrapping protected the camera from dirt and dust. There was a 40 mm lens on the camera. The angle of view on a 40 mm anamorphic lens is about the same as a 20 mm conventional lens.

There were just a couple of runs, but it was pure magic, like something straight out of *Road Warrior.* Maybe the editor only spliced 10 feet of this film into the middle of a scene, but it put the audience right in the middle of the stampede, and it made them taste the dust.

There was also a "crash" camera in a steel box operated by remote control. It was buried in the path where it was anticipated the buffalo would run. The idea was to record hooves running over the camera. It was a calculated risk which didn't pay much in the way of visual dividends. The buffalo came close once, but just then a clump of flying grass landed in front of the lens.

Most of the time, Semler worked with two or three cameras. Two of them were also equipped with video tape. That gave Costner the freedom to move freely between his dual roles as actor and director. He could look at the tape recorded when he was in a scene, and decide if he wanted to try something different.

That was particularly important, Semler notes, because there were many close-ups of faces. There was also a great deal of spontaneity, particularly by the Indian actors.

"We were very lucky throughout the shoot," Semler says. "The skies were extraordinary. Day after day, we had wonderful natural light. As the season changed to winter, the sun hung lower in the sky earlier in the day. We did a lot of shooting at dusk and sunset, when the sunlight was on the horizon. It was beautiful. I used graduated neutral density filters, but I didn't use any colored grads or diffusion filters."

One of the logistical problems was the danger of leaving footprints or dolly track impressions on the grass which would intrude on the illusion of the land being untouched.

"The grips, under key grip Bear, were the heroes of this picture," says Semler. "They found ways to lay 120 foot long tracks for long dolly shots without leaving marks. We also relied on the Steadicam much more than I normally would, because of the situation and the fact that we had a very talented operator. The second unit guys, Phil Pfieffer and John Huneck, did a great job on the huge vista shots and the inserts for the buffalo hunt."

Is there anything he would change in retrospect? "Don't you wish there was some way that wonderful wolf could have survived?" he asks.

Semler started his career operating a video camera at a television station in Australia. Within four to five months, he was shooting 16 mm newsfilm. Later, he shot documentaries and television movies for Film Australia.

His early dramatic film credits were for Australian TV and theatres. *The Road Warrior, Mad Max: Beyond Thunderdome, Razorback, The Coca Cola Kid, The Young Guns* and *K-9* are among the familiar titles he compiled before shooting *Dances With Wolves.* His most recent films are *The Young Guns II* and *City Slickers* and currently *The Power of One.*

"Clear, Crisp And Precise" *

With the release of Terminator 2: Judgment Day, more moviegoers than ever before discovered the best sound at the movies: Cinema Digital Sound.™

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The Doors

Oliver Stone's "The Doors" provided a second opportunity to compare boxoffice figures—in five markets, Los Angeles, New York, San Francisco, Dallas, and San Diego. Comparisons indicated a ***42% increase at the boxoffice****. Excluding New York, that figure soared to 88.6%. "The Doors" was the first CDS film to be released only on 35mm. An interesting note, the 35mm CDS print outdrew a 70mm magnetic print in one market.*

Terminator 2: Judgment Day

"Terminator 2: Judgment Day" offered the first opportunity for a direct boxoffice comparison. Twenty-three Cinema Digital Sound prints, in both 35mm and 70mm were released in the United States. Twenty-two theatre complexes in 11 markets played the prints. In addition to the digital prints, these same locations had 18 analog "T2" prints. Comparing theatres within the same complex, with the same seating capacities, the ***CDS prints showed an average improved gross during the first week of 42%, 60.5% the second week and 68.8% during the third week****. What is significant is there was a marked difference even during the first week of a blockbuster film. More importantly, in subsequent weeks, when audiences had a choice, they chose the Cinema Digital Sound system. In one location, "Terminator 2" was playing on two screens in the same complex, one 35mm CDS print, one 70mm magnetic. With similar seating capacities, the 35mm CDS print ran 8% higher during week one, 15% in week two, and 35% during the third week.*

In exit surveys conducted during the opening three days of "Terminator 2", ***42% of moviegoers*** *said they would go out of their way to see future films released with the Cinema Digital Sound system at CDS-equipped theatres. With a high-resolution film print, augmented with multi-channel digital audio there is simply no comparison to its ability to create an environment where the audience can temporarily suspend reality and participate in the fantasy. The CDS system is a co-development of Optical Radiation Corporation and Eastman Kodak Company.*

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Rochester, NY 14650, U.S.A.

KODAK Publication No. H-50-27

Printed in U.S.A.
Oct./91

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