The International 70 MM Association

70MM Newsletter no. 10. September 1990

TODD-AO 35 YEARS !

The TODD-AO Process

Using 70 MM Film, Special Cameras, Large Curved Screen and the Finest 6-Channel Hi-Fi Orthosonic Sound

A Special 25th Anniversary
Re-Release of the
Rodgers and Hammerstein Classic.

See the Musical that Won 5 Academy Awards
including BEST PICTURE!
IN 70MM 6-TRACK STEREO

TWENTIETH CENTURY FOX PROUDLY PRESENTS
RODGERS and HAMMERSTEIN'S

A ROBERT WISE Production

THE SOUND OF MUSIC

The Hills Are Alive...Once Again!

Starring
JULIE ANDREWS CHRISTOPHER PLUMMER
Co Starring RICHARD HAYDN with PEGGY WOOD and ELEANOR PARKER as the Baroness
Associate Producer SAUL CHAPLIN Music and Lyrics by RICHARD RODGERS and OSCAR HAMMERSTEIN II
Additional Words and Music by RICHARD RODGERS Screenplay by ERNEST LEHMAN
Production Designed by BORIS LEVEN Directed by ROBERT WISE
From the Stage Musical with Music and Lyrics by Richard Rodgers and Oscar Hammerstein II Book by HOWARD LINDSAY and RUSSEL CROUSE
Originally Produced on the Stage by Leland Hayward, Richard Halliday, Richard Rodgers and Oscar Hammerstein II
G GENERAL AUDIENCES All Ages Admitted
Produced in TODD-AO COLOR by DeLUXE®
©1965 Twentieth Century Fox

Exclusive Engagement STARTS TOMORROW

PRESENTED IN 70MM STEREO

CINEPLEX ODEON CENTURY PLAZA CINEMAS
CENTURY CITY 553-4291
Daily 12:30 • 4:30 • 8:30 PM
SORRY, NO PASSES ACCEPTED FOR THIS ENGAGEMENT

On the occasion of the 35th Anniversary of the TODD-AO 70 MM process a beautiful article has been written about history and future of the 70 MM formats by John Belton of Rutgers University, USA, in the SMPTE journal of June ! On page 4 & 5 you will find the most important parts of it as we couldn't reprint the total article of 8 pages !

More and more people are convinced that 70 MM has to return on the screens, not only as blow-ups, but also in the cameras with 65 mm negative film !

With the restorations of LAWRENCE, BEN-HUR and SPARTACUS (see at the foot of page 7) it is expected that more restorations will follow.

And the new Cinema Digital Sound (see page 7) will add an extra dimension to coming 70 MM films.

Thus more and more cinema owners are thinking about the installation of a 70 MM projector again !!

Johan C.M. Wolthuis

The International 70 MM Association

The 70 MM Newsletter is published bi-monthly and sent free to the members of the 70 MM Association.

Membership:

NLG 25. - per year. Payable by Eurocheque, International Money Order or Cash to the Secretary: J.C.M. Wolthuis, Katwoudehof 36, 6843 BX Arnhem. The Netherlands. (H o l l a n d)

"CHASING, AND FINDING, 70mm IN THE U.K"

Let's face it, promotion for 70mm is abysmally poor. What does it mean to the public at large? No mention of LARGE SCREEN 70mm which might excite a prospective customer and only a myopic mention of six-channel stereo sound as if it was almost indecent to advertise it more boldly - where other systems fear to tread!

Really, we have much to combat in promoting 70mm. Apathy from the general public who know little about it because they do not have the chance to be informed in a showmanship manner. Apathy from the distributors who see 70mm as an expensive format and restrict it's use. Here in the U.K. a single 70mm print may be used in London, sometimes with a back-up copy, and rarely is it used outside of the capital. There are plenty of cinemas with 70mm facilities but they never have the chance to use them. A 70mm print of a film which has outlived it's commercial life when offered outside of London has few takers.

The National Film Theatre in London has occasional 70mm presentations as does the National Museum of Photography, Film and Television in Bradford within easy driving distance of my home. The Bradford theatre, which is designed for IMAX presentations, shows 70mm unmasked using less than half of the screen area. It still provides a visually exciting frame with it's dynamic soundtrack. During June we have seen "The Star Chamber", "Born on the Fourth of July", "Black Rain" and "Die Hard" in 70mm.

But what of the commercial cinemas in the U.K? Our new Rank Odeon multiplex cinema with 8 screens in Hull opened this Spring without any 70mm facilities. The new Odeon in Sheffield (twin-cinema) also has no 70mm facilities. However, the new Warner Cinema multiplexes in Newcastle, York and Doncaster boast 70mm in one audorium as does the Showcase multiplexes in Derby and Leeds. Sadly, only one 70mm film has been shown in our York Warner complex since it opened - and that was for one day when it gave free shows prior to official opening - The film was "Indiana Jones and the Last Crusade".

Independent cinemas with 70mm facilities are few and whilst they are adventurous and try a 70mm film long after it's 35mm release, they are running a cinema as a business and not sheer altruism, so it is rare that such enterprise is rewarded financially.

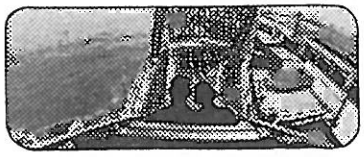
Admittedly most of the new multiplexes boast huge cinema screens and, with a fine 35mm print and good Dolby stereo, provide a good second-best to 70mm presentations. Some theatres showing 70mm do not do justice to the format when the screen size is only marginally larger than 35mm screenings (e.g. Plaza, London; Cannon, Salford Quays near Manchester) so I suppose it is hardly worth emphasising 70mm BIG SCREEN PRESENTATION.

I will still continue to chase, and hopefully find, 70mm screenings in the U.K. in spite of the problems in doing so!!

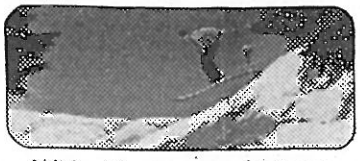
Terry Ladlow

"THE MIRACLE OF TODD-AO"

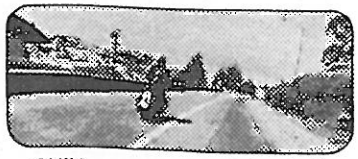
A Prologue that presents all that the eye can see through the TODD-AO wide angle lens!



JOIN in the super-charged excitement of a thrill-packed roller coaster ride.



With skis on your feet you sweep through breathtaking slopes in Sun Valley, Idaho.



CHILL your senses on the thrilling police motorcycle chase over San Francisco's hills.

Todd-AO: A History

By John Belton

Using 65mm camera film, specially designed wide-angle lenses, and six-track stereo magnetic sound, the Todd-AO system was first used to film Oklahoma, which was released in 1955. The success of this and a handful of subsequent Todd-AO films led to the introduction and establishment of a new wide-film standard of 70mm, which survives today as a major format for motion-picture presentation in the theater. This article reviews the development of the Todd-AO technology from the special wide-angle lenses designed by Dr. Brian O'Brien (former Professor of Optics at the University of Rochester), the 65mm Mitchell camera, the Philips Todd-AO dual (35/70mm) projector, and the Altec six-track magnetic sound reproducer to the system's "corrected printing technique," which eliminated distortion when wide-film images were projected onto a deeply curved screen from a high projection angle.

In 1989, the motion-picture industry witnessed the 100th anniversary of 35mm motion-picture film. Though 35mm film continues to be the dominant film format for commercial film production and exhibition, and was virtually the sole film gauge used by the industry for those purposes for over 60 years (from 1889 to 1955), it is no longer the only production and exhibition standard. Over the past 30 years, a second standard, that of 70mm, has entered the motion-picture marketplace. Today, there are more than 900 theaters equipped to show 70mm films and almost every blockbuster movie is screened in 70mm at these special, top-tier, first-run theaters.[1]

The term 70mm on a theater marquee or in a newspaper advertisement has become identified in the public's eye with the highest level of quality in motion-picture presentation. Like the trade name of Dolby Stereo, with which the term 70mm is almost invariably associated, a 70mm presentation promises, regardless of the quality of the film's dramatic content, spectacular entertainment values and, again like Dolby, is used to lure patrons into the theater. But, unlike Dolby Stereo, 70mm is not a trademark. It has established its special status in the film industry without the marketing muscle of a specific corporation within the service industry. It has become a generic term for wide-film, big-screen entertainment.

Though dozens of wide-film processes, ranging from del Riccio's Magnafilm (56mm, 1929) to Spoor and Berggren's Natural Vision (70mm, ca. 1930) and Fox's Grandeur Process (70mm, 1929), have been developed for adoption by the film industry, it was not until the 1950s, with the introduction of Cinerama, CinemaScope, VistaVision, and other widescreen systems that wide film emerged as a commercially viable solution to technical problems introduced by the widescreen revolution. Before Cinerama, which played on a 51 × 26-ft screen, and CinemaScope, which played on screens as large as 64 × 24 ft, the average screen size was 20 × 16 ft.[2] In blowing up images to fill this larger screen, CinemaScope, for example, enlarged its original 35mm film image 330,000 times, while the 35mm VistaVision frame, in projection, was enlarged 216,000 times (for a 55 × 27-ft image).[3] Both systems far exceeded the traditional 35mm Academy frame, which was enlarged 125,000 times (for a narrow 24 × 18-ft projected image). The sharpness and resolution of the projected image was suddenly put at risk, a danger which could only be eliminated by using larger negative areas in production and reducing them to 35mm for exhibition (as did the VistaVision and CinemaScope 55 processes) or by shooting and projecting films on wide-film stock. (Cinerama involved the use of three strips of 35mm film in both shooting and projection, as well as a six-perforation frame, which increased the height of the 35mm frame and the overall negative area.)

Todd-AO, introduced with the premiere of *Oklahoma* at the Rivoli Theatre on October 10, 1955, solved that problem, relying on a 65mm negative for filming, giving it 3½ times the negative area of 35mm film, and a 70mm print for projection (the extra 5mm being used to carry six magnetic soundtracks for stereo sound). Todd-AO achieved the sharpness and resolution of the average, pre-widescreen film, but did so on a bigger screen, enlarging, in projection, its five-perforation, 65mm frame 127,000 times (i.e., only 2,000 times more than the 1.33:1, 35mm projected image discussed above) to fill a 60 × 25-ft curved screen. The commercial success of *Oklahoma* ensured that wide film and a new production and exhibition standard of 65/70mm would gain acceptance within the industry.

Though the Todd-AO trademark appeared on only a handful of films and the Todd-AO Corp. currently exists only as a sound-mixing lab, the original Todd-AO process, which prompted the development of Technirama (1957), MGM's Camera 65 (1958), Panavision 70 (1959), and Ultra-Panavision 70 (single-strip Cinerama, 1963), it is clearly the antecedent of the 70mm, multitrack, magnetic stereo-sound processes found in the film industry today. Though the growth of 70mm exhibition in recent years, which increased from 300 screens in 1982 to over 900 in 1988, is a complex phenomenon that is determined by a variety of factors, this article will suggest that the present growth of 70mm as an exhibition medium can be understood, in part, by an examination of the unique demands which it has satisfied in the past. In other words, a historical survey of the development of Todd-AO may be useful in devising solutions to certain problems that face the film industry today, and it may also infer the course theatrical exhibition will take in the future.

A contribution received from John Belton, Rutgers University, New Brunswick, NJ 08903. Copyright © 1990 by the Society of Motion Picture and Television Engineers, Inc.

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Cinerama, which was
However, American
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You're in the show with

During the 1960s, many first-run theaters around the country screened films exclusively in 70mm. However, the motion-picture marketplace had taken its toll on 70mm production as well. The expense of filming in 65/70mm has, since the early 1960s, resulted in the gradual elimination of original production in 70mm. In 1963, Panavision's Robert Gottschalk introduced an optical system that enabled producers to blow 35mm film up to 70mm for purposes of theatrical road-show exhibition, virtually pulling the rug out from under wide-film production.[36] Now, any 35mm film could be blown up to 70mm for road-show presentation without the expense involved in wide-film production.

Since then, fewer than 30 films have been shot on wide film and more than 230 have been shot in 35mm and blown up to 70mm for first-run exhibitions.[37] The films that have been blown up range from 35mm anamorphic productions (*The Cardinal*, *Dr. Zhivago*, *Close Encounters of the Third Kind*, *Star Wars*, *Apocalypse Now*, and *The Untouchables*) to 35mm, flat, 1.85:1 productions (*E.T., the Extra-Terrestrial*, *Gremlins*, *Back to the Future*, *The Color of Money*, and *The Last Temptation of Christ*), resulting in blow-ups which crop the edges of the former and necessitate the addition of black masking along the sides of the latter.[38]

Though curved screens are no longer exhibition standards and although extreme, wide-angle, bug-eye lenses find infrequent use within contemporary filmmaking practice, the 70mm format, which the Todd-AO process successfully introduced in 1955, remains with us today, as does the notion of an exclusive circuit of motion-picture theaters that can provide audiences with a motion-picture experience which cannot be duplicated by contemporary 35mm exhibition. Within the past few months there has even been some movement within the industry back to 65mm as a production standard with the introduction by Arriflex of their new, extremely quiet (25-dBA), state-of-the-art 65mm studio camera, the ARRI 765
At the same time, Panavision announced its own updated 65mm camera.

The Future of the 70mm Format

A recent study conducted by Wilkofsky Gruen Associates for Merrill Lynch predicts that by 1995 the sale of prerecorded videocassettes will reach the 700 million per year mark, accounting for over $14 billion in revenues. In addition to this, another $6 billion will be realized in video rentals, adding up to a total of $20 billion. At the same time, based on recent statistics for theater admissions, they predict that motion picture box offices will take in revenues of only $8 billion. In other words, the video revenues of a motion picture will more than double its box office gross.[39] The only force within the marketplace that might reasonably retard this process, bringing audiences back into movie theaters, is the experience of 70mm coupled with stereo sound, an experience which can never be fully duplicated in the home. The answer to the future of the motion-picture industry, especially to that of theatrical exhibition, might just lie in the past, in the example of excellence set by Todd-AO in the 1950s.

Notes

1. Statistics courtesy of Dolby Laboratories, Inc., as of March 24, 1988.
2. Gio Gagliardi, *Motion Picture Herald*, August 6, 1955, 14.
3. Gagliardi, *Motion Picture Herald*, 15.

16. Though Todd-AO lenses were generally classified in terms of angle of view rather than focal length, their focal lengths were given as follows: 128° (22mm), 64° (44mm), 48° (58mm), and 37° (76mm).
17. Quoted in a report on the "Magna Theatre Corporation" for Twentieth Century-Fox by Harris, Upham & Co. (December 2, 1953). Sponable Collection, Box 120.
18. A 35mm, Technicolor, four-track magnetic stereo, CinemaScope version of *Oklahoma* is on deposit at the UCLA Film Archives. The CinemaScope version was released to non-Todd-AO houses after the wide-film version had completed its initial run.

25. The projector could handle 70mm film with any number of magnetic tracks; 70mm with a separate magnetic sound track; CinemaScope with four-track magnetic sound; CinemaScope with optical or Perspecta Sound; standard 35mm film; single-strip 3-D; and double-strip 3-D.
26. Robert E. Carr and R. M. Hayes, *Wide Screen Movies* (Jefferson, N.C.: McFarland, 1988): 187–188.

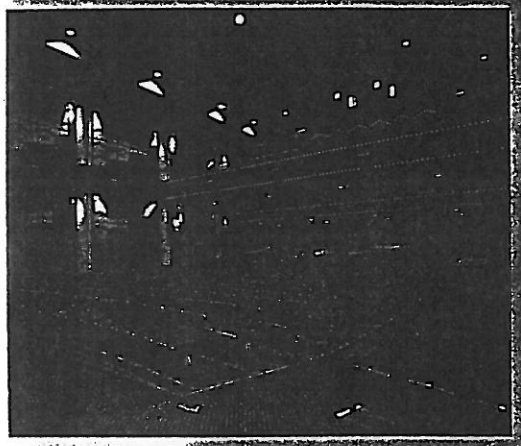
36. Douglas Trumbull, in conversation, October 14, 1988.
37. Hayes and Carr, *Wide Screen Movies*, pp. 187–189; 200–206.
38. The anamorphic image, which has an aspect ratio of 2.35:1, does not quite fit on a 70mm frame, which is roughly 2.21:1, thus requiring cropping. A 1.85:1 image doesn't quite fill the 70mm frame, which must then be masked. For an excellent discussion of blow-ups, see Carr and Hayes, pp. 196–206.
39. Bob Brewin, "VCR's: Bigger Than Box-Office," *The Village Voice* (March 11, 1986): 45.

The Audience is Listening

Until the early eighties, cinema sound relied largely on loudspeaker technology developed in the mid-forties. As elegant as these systems were in their heyday, they had fallen out of step with continuing developments in recording, noise reduction, and even home high fidelity technology.

Dolby Laboratories recognized the problem and introduced the benefits of noise reduction and loudspeaker equalization to the cinema industry during the seventies.

JBL also recognized the problem and introduced the concept of flat power response in the cinema via a new line of direct radiator woofers and uniform coverage high frequency horns in 1981.



At the production end of the creative process, Lucasfilm Ltd. recognized serious problems in the field when it became apparent to them that their 70 mm films could not be exhibited with the same sonic impact as heard in the dubbing theatre.

Building on components supplied by JBL, Tomlinson Holman, Chief Audio Engineer of Lucasfilm, Ltd., set out to design a new sound reproduction monitoring system specifically addressing problems in the cinema in a unified way. At first these systems were aimed at dubbing theatres, but they soon found their way into commercial cinemas when the company stated its conviction that every film and audience deserved the best which the industry had to offer.

The audience *was* listening, and the acceptance of THX Sound Systems has far exceeded everyone's expectations.

What is the THX Sound System?

The THX Sound System is basically a system design philosophy which integrates a cinema's acoustical design with the requirements for proper sound reproduction. The following points are essential to the system:

- New loudspeaker components exhibiting state of the art performance*
- A new proprietary frequency dividing network (including time offset correction) allowing biamplification to be optimized
- Ideal loudspeaker placement and mounting, providing the smoothest possible response before equalization
- Adherence to industry standards in sound system and projector operation
- Controlled cinema acoustics

*In order to offer cinema owners a selection of different manufacturers' components, the THX Program routinely tests equipment for compliance with system criteria. Approved equipment is then selected for use in THX System installations.

What Benefits Can the User Expect of a THX Sound System?

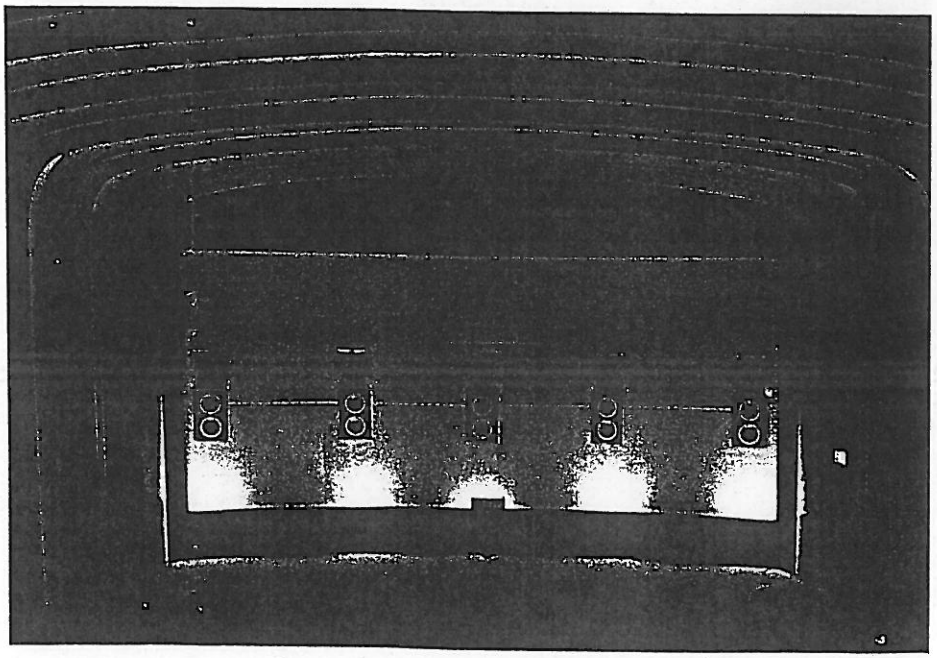
Compared with traditional technology, a THX Sound System will provide:

- Wider frequency range by a full octav in the bass and a full octave in the treb
- Noticeably smoother and more naturally balanced sound throughout the spectrum
- Audibly lower bass distortion
- Increased dialog intelligibility

It is important to realize that these performance attributes result from all aspects of the system's design—not fror any one part of it. They certainly cannot be achieved only by conventional equa ization techniques in which loudspeake and acoustical shortcomings are addressed electrically.

In many cases, the design and instal-lation of a THX Sound System costs no more than a conventional system. But it is not just a routine investment in new equipment; it involves careful planning and cooperation between cinema owne acoustical consultants, Lucasfilm engi-neers, and installation personnel.

The investment is made by the cinen owner for the advancement of the cinen art, and discriminating audiences will appreciate the difference it makes. The cinema owner's commitment to quality thus becomes the same as Lucasfilm's the accurate reproduction of all film formats; mono or stereo, 35 mm or 70 m



Cinema Digital Sound: the Next Step

September 1990

American **Cinematographer**

by Bob Fisher

Cut to Howard J. Flemming standing on the stage at the Directors Guild of America in Hollywood, where he is telling several hundred colleagues about a boyhood dream.

"The words next to my picture in my high school yearbook say, 'Howard wants to build the world's biggest hi fi," he said.

It almost sounded like the beginning of one of those 1940 movies that open with an impossible dream and conclude with a "Hollywood ending." Are there Hollywood endings in real life? Flemming was about to find out.

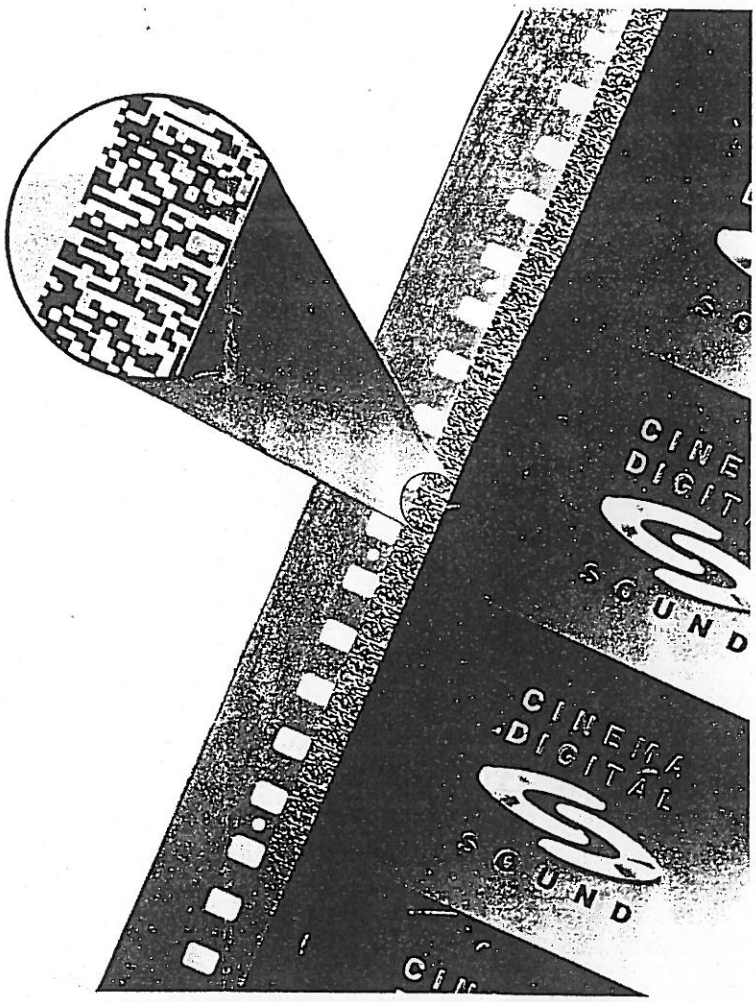
Flemming is program manager for Cinema Digital Sound (CDS) at Optical Radiation Corporation, which manufactures Century projectors, lamphouses and lens systems for theaters. The company co-developed CDS with Eastman Kodak's Motion Picture and Television Products Division.

He was about to unveil *Sounds Like the Reel World*, a demonstration film designed to amplify the benefits of the new audio technology. The demonstration film featured memorable lines, music and footage from some 20 films, starting with *The Jazz Singer*. There were intervals of total silence which amplified the dramatic impact of the visual message.

There is a stunning sequence where a bullet from a gun fired on screen sounds like it is ricocheting off the walls on a journey around the theater. The bullet appears to shoot out a lamp on the screen throwing the theater into instant darkness.

The co-development project linking Kodak and Optical Radiation was sealed approximately three years ago. Both companies were working on similar technologies. Optical Radiation was looking at the need from the prerspective of exhibitors. Kodak was focused on the needs of the production communities and labs.

Multiple-channel digital sound isn't a new concept for theaters. In fact, many special venue theaters at amusement parks use two-component digital sound systems. Sound is recorded digitally on a disc which is synchronized with the film projector.



70mm film with Cinema Digital Sound track illustrating the 5.5 million bits of digital information per second which provide six discrete channels of CD quality sound.

However, that approach is too cumbersome, expensive and prone to human error for a conventional theatrical environment. Cinema Digital Sound features six discrete channels of sound printed optically on the film. Five are full-bandwidth channels. The sixth is a subwoofer channel for the lowest frequency bass tones.

Movie dialogue is typically recorded in synchronization with the images on quarter-inch magnetic tape. Sound effects, music and additional dialogue are recorded separately. In a typical film, it isn't unusual for an editor to composite 40 or more sources of sound. With CDS, these different sources can be divided into the six discrete channels. After the sound is mixed, it is sent to a special Optical Radiation facility for encoding.

CDS quality is also consistent. In tests, prints encoded with optical sound tracks show no noticeable deterioration of audio quality after 1,000 runs. That ensures audiences will hear sound the way it is meant to be heard, Flemming emphasized.

In the real world, there is a very good chance that Flemming's dream will have a Hollywood ending. If that happens, the vehicle it rode to success was *Sounds Like the Reel World*.

From our correspondent, Bob Dickson in Los Angeles:

Announced yesterday (sept.23) is that Robert Harris, who did the "LAWRENCE" restoration, is to restore " S P A R T A C U S " in 70 mm for release somewhere in 1991.

Cinema Digital Sound

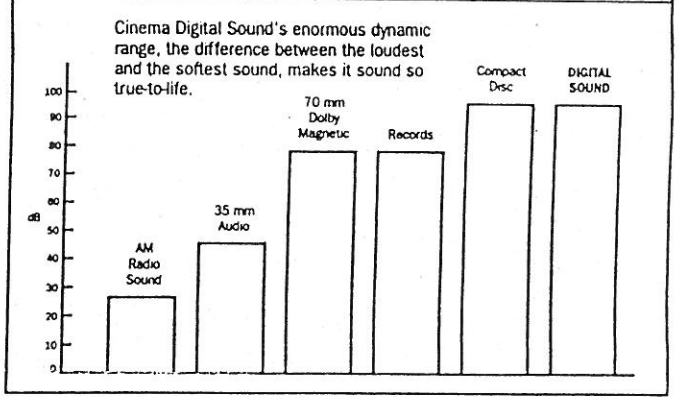
Technical Data

MOTION PICTURE SOUND SPECIFICATION COMPARISON				
FEATURE	35 mm "ACADEMY" OPTICAL	35 mm DOLBY STEREO OPTICAL	70 mm DOLBY MAGNETIC	**70 mm CINEMA DIGITAL SOUND**
Number of Channels	1	2 matrixed to 4	4 full-bandwidth 1 subwoofer	5 full-bandwidth 1 subwoofer
Dynamic Range New Print Worn Print	 52 dB 44 dB	 59 dB 51 dB	78–80 dB	 96 dB 96 dB
Channel Separation	NA*	12–49 dB	50 dB	100 dB
Frequency Range	30–6,300 Hz	40–12,500 Hz	30–14,500 Hz	20–20,000 Hz
Total Harmonic Distortion	1–7%	1–7%	3%	0.01%
Control Channel	None	None	None	MIDI
Synchronization Track	None	None	None	SMPTE Time Code
Film ID Information	None	None	None	ID Data Fields

*Note: NA = not applicable

Choose Kodak films for outstanding prints and sound. Our new EASTMAN Digital Sound Recording Film 2374 (Estar base) lets you take advantage of the new Cinema Digital Sound technology.

DYNAMIC RANGE COMPARISON



For more information on CD Sound technology contact:
Optical Radiation Corporation
1300 Optical Drive
Azusa, California 91702
1-800-767-0456

PRINTED MATTER

DRUKWERK

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