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# Widescreen Review®

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## WELCOME!

With summer just around the corner, things are really heating up. Not so in Alaska, where the Home Theater Cruise took place just last week. Even though it was cold out, a great time was had by all, and in the September issue of *Widescreen Review* we will bring you a few of the highlights from the Conference At Sea. We will be taking a month off from the print magazine, with the July/August issues being combined into one, so expect to see some additional content in next month's July Newsletter. This month's archived article is from Issue 30, "The History Of Cinema Sound." And if you haven't yet entered to win one of the DVDs featured in our various contests, be sure and click on the links in the Studio Scoop or go to [www.widescreenreview.com](http://www.widescreenreview.com) and enter.



Gary Reber  
Editor-In-Chief, *Widescreen Review*

## NOW AVAILABLE ON NEWSSTANDS

Issue 132, June 2008 of *Widescreen Review*:

- "Marantz VP-11S2 1080p DLP™ Projector" By Greg Rogers
- "Russound® Complement LCR7 & SUB105 On-Wall Loudspeakers & Powered Subwoofer" By Gary Altunian
- "Samsung BD-UP5000 Duo HD Player" By Mike Marks
- "An HD Optical Disc Timeline: Our Coverage Of The Competing Formats" By Danny Richelieu
- "The Digital Dilemma: Preserving Today's Films For Tomorrow's Audiences" By Bob Fisher
- "Deep Impact Part I: The Technology Of 3D Cinema" By Alen Koebel
- Plus "Connecting Dots..." By Amir Majidimehr, "Your Letters," "One Installer's Opinion" and 38 Blu-ray Disc and DVD picture and sound quality reviews and more...



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# Coming Soon... To A Retailer Near You

Tricia Spears



Panasonic SC-BT100

**Panasonic** has announced its first home theatre in a box (HTiB) system with an integrated Blu-ray Disc® player, the **SC-BT100**. Available in late spring for \$1000, the SC-BT100 features an advanced integrated dock

that recharges an iPod®, plays music or video through the system, and displays audio tracks and menus on a television screen. Its SD Memory Card slot offers simple playback of digital images or original video footage in either standard or high-definition. Equipped with Viera Link™ digital audio/video connectivity for one-touch operation, the Blu-ray™ player includes the Final Standard Profile (Profile 1.1) for advanced functions such as Bonus View and audio mixing. The system delivers advanced audio, and the built-in receiver is compatible with state-of-the-art audio codecs. The Kelton-design subwoofer features a driver anchored to the cabinet and a passive radiator to reduce vibration, and the system includes Whisper-mode Surround™, which dynamically boosts bass and surround-channel levels as the volume is turned down for a surround effect even at a low volume.

Panasonic 800 211 7262 www.panasonic.com

**RealTraps** has introduced a new use and mounting arrangement for their existing line of bass traps and acoustic panels—**MiniGobos**. Available in a variety of sizes and configurations to favor either isolation, bass trapping, or broadband absorption, the attractive and portable room treatment solution avoids the need for stands or wall mounting and uses hinges to join two or more panels together as a single unit that's stable, easy to handle, and is self-supporting.



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Designed as a chair, sectional sofa, and with the option of creating row-configured seating, the **STRATO** from **CINEAK** adds a very unique dimension to the typical and modern-looking, clean lines of a European couch. With its unique dual-motorized incline mechanism, the product does not use any space at all behind the chair when it moves or inclines, making it truly a "zero wall" piece of furniture. One motor allows the seating piece and footrest to be extended, the other motor allows for the headrest and backrest to be adjusted. Multiple widths in seating parts and armrests and a wedge-shaped arm allow for more options when creating your room's layout. The different options can be seen and put together through CINEAK's no commitment AutoCAD design services.



CINEAK STRATO

CINEAK 866 458 0529 www.cineak.com

**Netflix, Inc.**, the world's largest online movie rental service, and **Roku, Inc.**, an innovator in digital media-streaming technology, have introduced **The Netflix Player by Roku**. Allowing Netflix subscribers to instantly stream a growing library of movies and television episodes from Netflix directly to the TV, the player is available for \$100. Simple to install and easy to use, the player gives Netflix members instant access to more than 10,000 movies and TV episodes. Allowing consumers to use the full power of the Netflix Web site to choose movies for their instant Que, and then automatically displaying only those choices on the TV screen, there are no extra charges and no viewing restrictions. The player is Wi-Fi enabled and comes with a remote control that allows members to browse and make selections on the TV screen, gives them the ability to read synopses and rate movies, and is capable of fast-forwarding and rewinding the video stream via the remote. The product also includes optimization of the Netflix video-streaming technology, which eliminates the need for a hard disk drive associated with video downloads, and built-in connectivity for automatic software upgrades.



Netflix Player by Roku

Roku, Inc. 888 600 7658 www.roku.com



Video Mount Products VH-005

**Video Mount Products** has debuted its **VH-005** Pipe/Ceiling Mast Electronic Component Holder. The VH-005 works well with all ceiling mounts using masting from 1- to 2-inch O.D and accommodates DVD, Blu-ray Disc®, and CD players; DVRs; HD receivers; and other electronic components weighing up to 25 pounds. Including a mounting "U tray,"

which extends 13 inches from the pipe, decorative plastic covers, and available in silver or black powder-coat finishes, the VH-005 Pipe/Ceiling Mast Electronic Component Holder retails for \$50.

Video Mount Products 410 643 6390 www.videomount.com

**Klipsch's** new **KL-7502-THX** LCR and **KS-7502-THX** loudspeakers are the market's first THX® Ultra2-certified in-ceiling surround loudspeakers. The KL-7502-THX is designed to be a left, center, or right main channel loudspeaker, as well as a back-channel surround. It employs dual 5.25-inch Cerametallic woofers that operate in an enclosed tuned-port chamber. The woofers are mated to the 1-inch titanium tweeter via precision-voiced, high-definition crossover networks, producing a flat in-room frequency response, as well as the company's "signature" high-efficiency, low-distortion sound. The KS-7502-THX utilizes the same low-frequency driver design and crossover networks as the LCR, but the difference lies in the top end, where dual 1-inch titanium horn-loaded tweeters lie in a patented vertically stacked Wide Dispersion Surround technology array. The top-of-the-line loudspeakers have a premium look and feel with their grills off, featuring a deluxe MDF baffle with aluminum fascia. When covered, the loudspeakers paintable grills allow them to blend in with any home décor. The KL-7502-THX and KS-7502-THX loudspeakers are available for \$1,000 each.



Klipsch KS-7502-THX

Klipsch 800 554 7724 www.klipsch.com

# The Studio Scoop

Rumors, Reports, & Ramblings

## Stacey Pendry

### DVD Contests

Because our DVD contests have proven so popular, I've received additional titles from the studios to give away to our readers. This month you have the chance to win the hilarious sequel *Harold And Kumar Escape From Guantanamo Bay*. All you need to do is click on the DVD box art for the entry form. All entries for this title must be received no later than July 30th to be eligible to win.

*Journey To The Center Of The Earth* is also up for grabs! Just click on the box art to submit your entry for this title. Your entry needs to be received no later than July 9th to qualify to win this exciting Sci-Fi title.

Reminder: It's not too late to enter to win one of the seven titles in our **Spectacular Summer Giveaway**. The full-page entry form is contained in this newsletter. Be sure to submit your entry on or before July 30th to win one of the fantastic titles from Warner Home Video.

Congratulations to May's DVD contest winners who won a copy of *P.S. I Love You*.

### Universal

Hugh Grant has signed on to star along side Ziya Zhang (*Rush Hour 2*) in an upcoming comedy scripted by Jamie Curtis and Dan Mazer (*Borat*).

Grant will play a British movie star who has been offered the lead role in a film by a female Chinese director. Grant initially falls for the director's flirtatious translator, but soon realizes that he is more attracted to the Director (Zhang) instead. Unfortunately for Hugh's character, the only mode of communication is through the spurned translator, who now has other motives other than accurately relaying his feelings to her boss.

Working Title partners Tim Bevan and Eric Fellner will produce the film, along with Jonathan Cavendish. Susanne Bier (*Things We Lost In The Fire*) is slated to direct the flick that is due to begin filming in September.

Ryan Gosling will again team with *Lars And The Real Girl* Director Craig Gillespie to bring a drama entitled *The Dallas Buyers Club* to fruition for Universal.

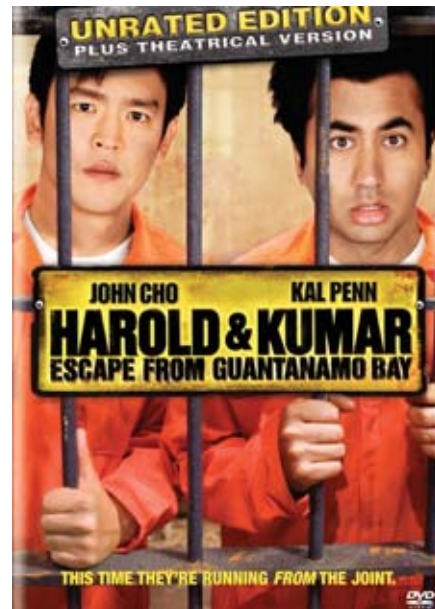
The film is based on the true story of Ron Woodroof, a rough-and-tough Texas electrician who was diagnosed with AIDS in 1986 and given six months to live. Frustrated with the lack of drug therapies available in the U.S., Woodroof found that some alternative drugs worked quite well against the disease. Unwilling to accept a death sentence



and not able to find the drugs he needed locally, Ron created a lucrative smuggling business that made the alternative drugs available to AIDS patients.

The project was originally set up in 2002 as a vehicle to star Brad Pitt and has seen a number of scribes write and rewrite the script. The current incarnation will be penned by Chase Palmer.

The project's Producer David Bushell (*Sling Blade*) said, "Ron was a hard-drinking, carousing outlaw who got ticked off when told to go home and die. This is about one man's enduring spirit to live and the effect his actions had on others, even if his actions didn't start out as entirely altruistic. *Lars And The Real Girl* showed Craig's ability to take offbeat, almost dangerous



characters and make you want to bring them home for dinner, and Ryan stirs the deepest emotions with every performance."

Clint Eastwood's much anticipated film, *Changeling* is set to release on October 24th in a limited run, with the wider opening a week later.

The film was recently premiered under an alternate title, *The Exchange*, at Cannes, where it was in competition, thus prompting speculation that Universal may change the title domestically. It seems Mr. Eastwood prefers *Changeling* to *The Exchange*, and so the film will be released as he wishes.

Set in 1920's Los Angeles, it stars Angelina Jolie as a woman whose prayers are answered when her abducted son is returned to her. It doesn't take long for Jolie's character to suspect the boy who the police return is not her son, and a corrupt police force is exposed.

Eastwood directed the script by J. Michael Straczynski that also stars John Malkovich.

### Paramount/DreamWorks

Paramount has announced that the original cast of *Madagascar*, who are to reprise their roles in the sequel *Madagascar: Escape 2 Africa*, will be joined by some new A-list talent, including Bernie Mac, Alec Baldwin, and Will.i.am.

Mac joins the cast as Zuba, Alex the

Lion's (voiced by Ben Stiller) dad. Zuba's archrival Makunga will be voiced by Baldwin, with Will.i.am playing a watering-hole lothario named Moto-Moto.

In the new story, Alex, Marty, Melman, Gloria, King Julien, Maurice, and the penguins are stranded on Madagascar, an island just off the coast of Africa. The ingenious penguins manage to repair an old crashed airplane that stays aloft just long enough for the zoo-reared animals to make it to the mainland of Africa. Once there, the rag-tag crew meets species of their own kind for the first time.

Will.i.am will serve as co-composer alongside Hans Zimmer, who composed the score for the original film. Eric Darnell and Tom McGrath will return as directors.

Paramount has slated a November 7th release date and is hoping to net box office receipts close to the original film, which grossed \$532 million, worldwide.

*Transformers* is headed for release on Blu-ray™ nearly a year after Paramount's decision to issue the film on HD DVD exclusively, which triggered a blogging tirade from the film's director, Michael Bay.

The title will be released on September 2nd in a two-disc set that will have Blu-ray fans cheering. Bay said, "I've been waiting for *Transformers* to be released on Blu-ray for a long time, and it was worth the wait. It looks stunning and really allows you to engage with this movie in new ways." Bay added, "Remember I told you Blu-ray was best."

When Paramount announced its backing for the now defunct HD DVD format and their intent to release *Transformers* in HD DVD, it was a flashpoint for controversy. It was Paramount/DreamWork's biggest title of the fourth quarter, and the Blu-ray disc edition has already been mastered and was prepped for release, prompting Bay to blast Paramount's decision on his Web site and threaten to take his sequel elsewhere.

Now it's all good between the studio and Bay, and the sequel *Transformers 2: Revenge Of The Fallen* reportedly began filming on June 2nd under the DreamWorks banner. Shia LaBeouf is reprising his role of Sam Witwicky, the hapless teen that unwittingly helped saved the world in the first film. DreamWorks is eyeing a June 26, 2009 premier.

Leonardo DiCaprio is set to star in an upcoming project from Paramount tentatively titled *Atari*. Written by Brian Hecker and Craig Sherman, the biopic tells the story of Nolan Bushnell, one of the founding fathers of the video game industry.

Bushnell and Ted Dabney founded Atari in 1972 and were key in bringing popular arcade games and home video game consoles to the masses. We all remember Pong, the now incredibly simple video game that started a multi-billion dollar industry.

DiCaprio is set to produce the project via his company Appian Way.

#### Sony/Columbia Pictures

Keira Knightley is currently negotiating with Columbia Pictures to star in a remake of *My Fair Lady* as Eliza Doolittle, a simple Cockney flower girl who is transformed into a Lady by her mentor, Professor Henry Higgins.

While being touted as an update to the Lerner and Lowe musical, the film will retain the musical's score and its 1912 setting. However, where possible, the project's

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would-be producers Duncan Kenworthy (*Love Actually*) and Cameron Mackintosh intend to shoot on location in London's Covent Garden, Drury Lane, Tottenham Court Road, and Ascot Racecourse. The 1964 Warner Bros. film was shot entirely on a Hollywood set.

While the studio is keeping quiet on casting for the other roles in the project, Columbia Pictures co-President Doug Belgrad did say, "This update will preserve the magic of the musical, while fleshing out the characters, and bringing 1912 London to life in an authentic and exciting way."

*My Fair Lady* first hit the stage in 1956 starring Julie Andrews as Eliza and Rex Harrison as Higgins. Harrison went on to star in the big-screen adaptation along with Audrey Hepburn in the Oscar®-winning film directed by George Cukor.

Fifty years after their creation, the *Smurfs* are coming to a cinema near you. Columbia Pictures and Sony Pictures Animation are bringing the tiny blue Belgians to the big screen via a live action/CG animated feature-length movie.

The small blue-folk, who stand no more than three apples high, were first created in 1958 by Belgian cartoonist Pierre Culliford, known the world over as Peyo, but are best known in the United States from the long-running Hanna-Barbera cartoon that graced the small screen as part of NBC's Saturday morning line-up from 1981-1990.

Jordan Kerner (*Charlotte's Web*) is producing the project with David Stern and David Weiss (*Shrek 2* and *Shrek The Third*) in negotiations to write the script, which will mark Sony Picture Animation's first foray into the live action/animated hybrid genre. Kerner secured rights to the Smurf's property in 2002 and has been developing a 3D CGI feature with Paramount/Nickelodeon, which has the option to co-finance the project and distribute internationally.

Belgrad said, "The Smurfs are one of the best known franchises and among the most beloved collection of characters in the world. We're very excited to introduce a new generation to Papa Smurf, Smurfette, and the other smurfastic Smurfs in all of their 'three apple tall' glory."

Smurfastic indeed.

Reese Witherspoon and Ben Stiller have signed on to star in a new Cameron Crowe romantic comedy for Columbia Pictures.

Columbia beat out four other studios in procuring the fully developed project that is due to be produced by Scott Rudin (*No Country For Old Men*). Crowe wrote the screenplay and will also produce.

The film reunites Crowe with Columbia for

the first time since *Almost Famous* in 2000, and will pair Rudin and Crowe for the first time. The project is due to begin filming in January when both Stiller's and Witherspoon's schedules are clear. It is still untitled.

### Warner Bros.

Guy Ritchie has signed on to direct Warner Bros.' *Sherlock Holmes* for Producer/Writer Lionel Wigram and Producer Dan Lin.

The newest incarnation of Sir Arthur Conan Doyle's character is based upon Wigram's upcoming comic book, *Sherlock Holmes*. While Doyle emphasized Holmes' intellectual brilliance and power of deductive reasoning, Wigram's Holmes will be a more adventuresome fellow, taking advantage of his skills as a boxer and swordsman to bring mysterious cases to an end.

While the official title is still under wraps, Warner Bros. is eyeing a 2010 release.

Ritchie is currently directing *RocknRolla*, which he wrote the screenplay for Dark Caste Entertainment, and will be distributed by Warner Bros.

Lin and Wigram are both former Warner Bros. creative executives. Lin, having worked on *The Aviator* and *The Departed*, and Wigram worked on the *Harry Potter* films.

Matt Damon has signed to star in *Human Factor*, Clint Eastwood's new film for Warner Bros. Morgan Freeman has already signed to co-star and is set to produce, along with Lori McCreary, Rob Lorenz, and Mace Neufeld.

The film is based upon the John Carlin book *The Human Factor: Nelson Mandela And The Game That Changed The World* and will be scripted by Anthony Peckham.

Damon will play rugby star Francois Pienaar who created, along with Nelson Mandela, an event that gave white and black South Africans a common cause to rally around. Both white and black countrymen rooted for the South African rugby team, the Springboks' win against the formidable New Zealand All Blacks in the 1995 Rugby World Cup game, which South Africa won in overtime. Until then, the Springboks had been banned from international competition because of South Africa's apartheid policies. **WSR**

## COMING SOON TO A NEWSSTAND NEAR YOU

Issue 133, July/August 2008 of *Widescreen Review*:

- "Samsung PN50A550 50-inch 1080p Flat Panel Display" By Doug Blackburn
- "Westinghouse TX-52F480S 52-inch 1080p LCD HDTV" By Mike Marks
- "Five Audio Switchers" By Bill Cruce
- "An Interview With The Sages Of Wisdom Audio" By Danny Richelieu
- "Deep Impact Part II: 3-D Home Video" By Alen Koebel
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# Spectacular Summer **DVD** Giveaway Contest

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[www.WidescreenReview.com](http://www.WidescreenReview.com). All DVDs are NTSC Region 1.

Entries must be received by July 31, 2008.

Titles preferred are not guaranteed to be won. One DVD winner per physical address.



# The History Of Cinema Sound

PERRY SUN

## Introduction

For much of its life, sound in cinema has been considered by the typical moviegoer to serve merely as an accompaniment to, or an ancillary component of, the movie experience. What is often overlooked, though, is the fact that film sound has played important roles in most of the significant developments in cinema. Indeed, some would even consider the beginning of sound for movies to be the greatest event in the history of cinema since the invention of motion pictures. Today, in the age of digital sound, a growing population of avid film buffs are realizing that listening to a movie is just as important as watching it.

For the past seven decades, moviegoers have been able to experience the glory of cinema with images accompanied by sounds. This magic of sound and picture has made its way through many periods of development, success and failure. However, the unique chemistry of these two essential aspects of film has endured, and will likely continue to do so for many years to come. A timeline of some the most important milestones in the history of sound in the film industry is shown in Figure 1. In this article, we will take a look back over the major events in the evolution of presenting movie sound to the audience.

## The "Talkies" Era — A Revolution In Cinema

On October 6, 1927, audiences witnessed the first successful use of synchronized sound in a feature film. In *The Jazz Singer*, actor Al Jolson sang a number and then proudly delivered the line "Wait a minute! Wait a minute! You ain't heard nothing yet!" The response from the audience to someone talking right from the screen was absolute enthusiasm, signaling possibly the most important turning point in the history of cinema—the sudden, swift transition from silent films to talking pictures.

Prior to this momentous premiere, there

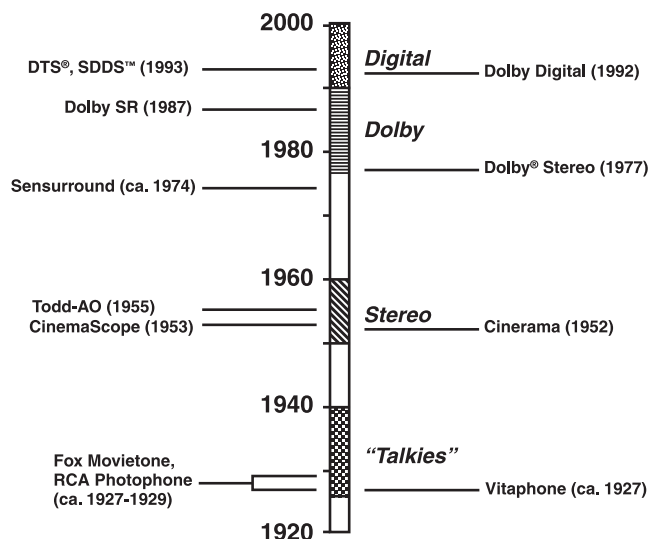


Figure 1: Timeline of some important events in the history of film sound.

had been many developments and attempts to synchronize sound with the moving image. These go back some 30 years to Thomas Edison's Kinetophone system. Edison believed that the true experience of films was possible only when motion pictures were presented in concert with sounds. Decades of trying to surmount technical difficulties prevented his prophecy from being fulfilled, until Al Jolson finally made his presence heard to the public.



Figure 2: Movietone film frame. The variable density soundtrack is to the left of the picture.

*The Jazz Singer* was released by Warner Bros. using their Vitaphone sound system. Vitaphone utilized sound technology developed by Western Electric where audio was reproduced from phonograph records—the so-called sound-on-disc system. At about the same time, Fox had their sound system, Movietone, which was based on the sound-

on-film concept, whereby audio was optically recorded onto the film print by modulating the density of the emulsion (see Figure 2). RCA appeared on the scene shortly thereafter with their Photophone system, also a sound-on-film format, but was based on optical recording by varying the area of the soundtrack, rather than the opacity. (The fundamentals of the RCA sound-on-film system are still used in today's 35mm optical soundtracks (see D in Figure 5)). Western Electric would eventually embrace the Movietone system, developing the technology to improve its performance. Figure 3 shows an early 1930's Simplex projector with both sound-on-disc

and sound-on-film capability. (The Vitaphone system, although the first successful use of sound in a commercial feature, had technical limitations, and was replaced with sound-on-film by the early 1930s.)

Whatever the sound system being used, the universal sentiment in Hollywood was that talking pictures were here to stay. The rise of sound in film was so rapid, that by the end of the 1920s, the era of silent films had passed into oblivion. The success of talking pictures also led to the substantial rise in prominence for several movie studios such as Fox, Warner Bros., and RKO (Radio-Keith-Orpheum) Pictures.

In order for sound films to be possible, important strides were necessary in audio recording, amplification and loudspeaker design. These were essential not just for fidelity of sound, but also for the ability to deliver to the audience in a very large space (at the time, movie theatres were being built with sizes upward of 5,000 seats). These developments were from Western Electric (based on engineering achievements in telephone transmission), and General Electric (technological innovations in radio). Much of the fundamentals of these sound technologies remain to this day.

As sound films continued their success and prosperity throughout the 1930s, it became apparent that a standard was necessary for theatrical sound system performance,



due to imperfections in sound recording, playback equipment, the acoustical environment and the tendency for these anomalies to interfere with the quality of sound presentation. The Academy curve, established in 1938, specifies substantial attenuation at the low and high frequencies, allowing only the dialogue range (or midrange) to pass unfiltered. This criterion for sound presentation would remain the only standard until the late 1970s, with the advent of Dolby® Stereo.

## Widescreen Movies — The Stereo Era

As talking pictures progressed into the norm of cinema, there was an increasing desire among filmmakers and film technologists to make sound more dimensional and spatial, filling the large enclosures of a movie house. The early experiments on stereo sound from Bell Laboratories in the early 1930s provided the first convincing demonstration to the public that reproduction of audio, in dimension and space, could be achieved through multiple, independent channels of sound (Bell Labs determined that three stage channels were sufficient).

The first attempt to bring stereophonic sound to the movies was from Disney and RCA for the film *Fantasia* in 1940. Known as Fantasound, a 35mm film print carried the optical soundtracks for left, center, and right channels behind the screen, and was run in interlock with the projector. A surround channel was created by first extracting sound from the main channels, and then distributing to speakers throughout the theatre. Success was limited though; only six locations were installed with Fantasound, and the sound was not true stereo since the channels were not fully independent of each other.

The first success with stereophonic movie sound was the debut of Cinerama® in 1952. At the time, Hollywood was fast losing competition to the rapid rise of television. A boost for the film industry was badly needed. In the feature film *This Is Cinerama*, the celebrated roller coaster scene demonstrated the capabilities of multichannel stereo sound. Five speakers tracked sound movements on-screen, while ambient sound was delivered to surround speakers. The surround speakers were divided into left, right, and rear. A single channel was steered to the left or right surround speakers, and the rear speaker picked up sound from any of the other channels. The six tracks of sound (five on-screen, one surround) were recorded on 35mm magnetic film and run in interlock with projectors for the three panels of images comprising the



Figure 3: Early 1930s Simplex projector with sound-on-disc and sound-on-film capability.

wide Cinerama picture. (Future Cinerama productions had a seventh sound channel.) Figure 4 shows a diagram of a Cinerama theatre, with speaker and projector layouts.

The response to Cinerama was sheer amazement, signaling another turning point in the evolution of movie sound. Stereophonic audio was shown to be absolutely convincing in conveying a visceral sonic image which reinforces the visual experience. (For many audiences, Cinerama was their first experience with stereo sound in general.) However, Cinerama would prove to be too expensive and with too many technical problems to be considered a viable film format. In 1955, the Todd-AO® system was introduced using a similar channel configuration to Cinerama. Five screen channels plus surround, recorded on 35mm magnetic film ran in interlock with the 70mm projector. The first production with Todd-AO was *Oklahoma!* (Later Todd-AO films would have the sound channels on magnetic stripes alongside the picture on the 70mm film print.)

While Cinerama and Todd-AO delivered sound using dual systems (sound and picture on separate media), Fox elected to provide

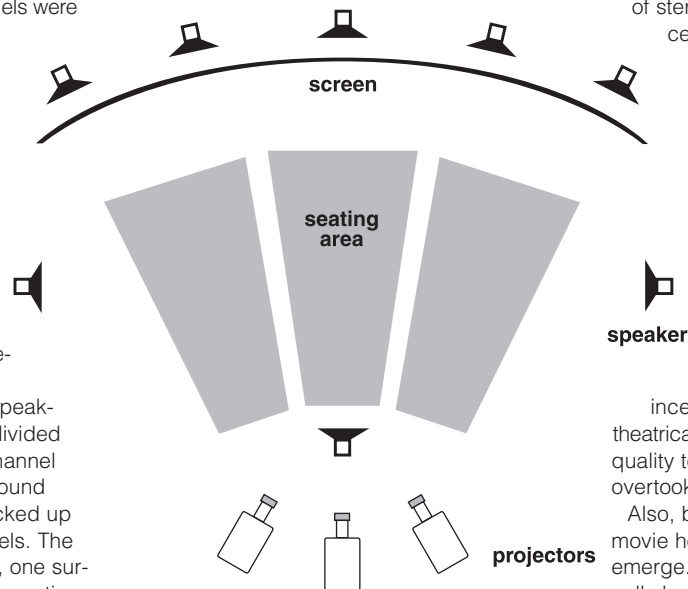


Figure 4: Cinerama loudspeaker and projection layout.

stereo sound and picture on a single 35mm film print. In the audio system designed for CinemaScope, four channels (left, center, right, surround) were recorded on separate magnetic stripes located on the sides of both sprocket holes of the film. The premiere of CinemaScope came in 1953 with *The Robe*.

Although Cinerama, Todd-AO and CinemaScope were hailed as technological marvels in cinema sound, none ever became widely used. The equipment was expensive, requiring conversion to magnetic playback systems and the addition of amplifiers and speakers. The printing of magnetic stripes onto the print was costly as well, and more prone to wear than optical soundtracks. Furthermore, many of the films released in these formats were "roadshow" presentations, thereby limiting availability for exhibition to one or a few cities. The Perspecta Sound® format from Fairchild (used by MGM and Paramount's widescreen VistaVision® format) attempted to use a single optical track to provide some dimension to the sound. Subsonic cues in the soundtrack were used to direct the monophonic audio signal to left, center, or right speakers. This approach could not create the ambient sound field possible with the magnetic formats.

Ultimately, attempts to bring stereo multichannel sound to the movie screen faltered in the 1950s. However, the huge success of consumer stereo owes itself to this period of movie sound, where true, spatial and realistic audio was first made widely available to the public. The significant developments in multichannel film sound paved the way for the future successes of Dolby Stereo in the 1970s and digital sound in the 1990s.

From the 1950s to the 1970s, the failure of stereophonic movie sound to flourish centered upon some unfortunate

trends in movie theatres. In 1948, the U.S. government's antitrust ruling forced movie studios to relinquish ownership of their theatres. Many of these theatres would end up closing soon after, due to huge downturns in business as a result of the enormous popularity of television. Those movie houses that survived usually could not afford to upgrade or maintain their sound systems.

As a result, there was generally no incentive to release films in stereo, and theatrical sound systems would degrade in quality to the point where consumer audio overtook them as the quality standard.

Also, beginning in the 1970s, multiple movie houses, or multiplexes, began to emerge. Theatrical owners could economically benefit by housing multiple films, but seemed to insist on keeping sound presentation quality to a bare minimum. Older theatres





were divided up into smaller houses, and new multiplexes sprang up everywhere. The multiplex would soon create problems for film sound presentation—a diminished spatial experience, and the tendency for sound to leak between adjacent auditoriums—in addition to already shoddy presentation standards.

However, during this “dark” period of movie sound presentation, there was one positive development which would start a new trend in future film audio formats. In the early 1970s, the loudspeaker manufacturer Cerwin-Vega developed the Sensurround® system in which several subwoofers were installed throughout the movie theatre. They were triggered to produce deep bass signals when called upon by subsonic cues in the soundtrack. The effect was to invoke a tactile sensation from the audience to heighten the visceral effect of a particular scene. Universal was the only studio to release films with Sensurround, the most notable being *Earthquake* in 1974. The use of deep bass in movie sound proved to be effective and would lead to the future use of subwoofers in Dolby Stereo, 70mm 6 track Dolby Stereo, and digital sound installations.

## A New Beginning — The Dolby Era

Beginning in the early 1970s, and continuing to this day, the engineering achievements at Dolby Laboratories have led to several of the most important advances in film sound technology. Dolby's A-type noise reduction system was first developed for the professional music recording industry, but later applications to film sound recording were shown to be highly beneficial in reducing the inherent noise levels in both magnetic and optical recordings. The lower noise achieved with optical soundtracks, in particular, would eliminate the need for the extreme treble cutoff specified in the Academy standard, leading to sound with greater clarity and improved dynamic range.

However, the next development at Dolby Laboratories would usher in yet another new age in the history of movie sound. A viable film format allowing for the reproduction of sound in stereo had long been desired. The magnetic stereo formats of the 1950s were too expensive and were introduced at a time when the market could not afford them. Dolby's solution in the mid-1970s came as a result of the failure of a then-recent advance in consumer stereo, quadraphonic sound. The principle was to combine four audio channels (left, center, right, surround) into the conventional stereo left and right channels, which are carried on stereo optical soundtracks. Then when played back, the left and right channels are passed through a decoder to extract the original four channels.

Dolby Stereo had the important advantage over previous stereophonic formats in that it was compatible with theatre systems equipped only for mono sound, so cinemas could play Dolby Stereo films on their older equipment, upgrading when desired.

The first films to feature Dolby Stereo were *Lizstomania* in 1975, and *A Star Is Born* in 1976, both as test releases. The opening of *Star Wars* in 1977, and *Close Encounters Of The Third Kind* later that year, greatly excited the cinema industry and the moviegoing public, leading to the beginning of the boom for new Dolby Stereo installations throughout the world. The age of Dolby Stereo finally began the demise of monaural sound in cinema. From the rest of the 1970s through the 1980s, Dolby Stereo expansion would continue, more and more films would be released in this format, and more moviegoers would become aware of the benefits of quality movie sound presentation.

Dolby Laboratories also ventured into 70mm six-track sound, implementing their noise reduction technology. The channel configuration was sometimes similar to that originally used in Todd-AO (five channels behind the screen; one surround), but Dolby often incorporated some modifications. First, bass information (known as “baby boom”) was added to two of the screen channels to be filtered out during playback and output to a subwoofer. Second, these two screen channels were used instead for separate left and right surround, so that an ambient stereo effect could be achieved throughout the theatre. The first film to use stereo surrounds in 70mm was *Superman* in 1978, but the most publicized film featuring 70mm split-surround was *Apocalypse Now* in 1979. Not many films were released in 70mm 6 track Dolby Stereo because of the substantial costs (to both studio and cinema), but the benefit of stereo surround reproduction would be an important influence in the development of digital movie sound.

While Dolby Stereo was proving to be a system capable of high fidelity sound and convincing stereo imaging, these benefits could only be realized in a theatre equipped with an exemplary sound system. Unfortunately, at the time Dolby Stereo was being introduced, the majority of theatres failed to properly maintain their audio playback equipment, which was often antiquated and dilapidated. In 1980, George Lucas, thoroughly dissatisfied with the inadequate sound capability of these theatres, set out to develop an audio system for movie theatres incorporating design and performance standards to auditorium acoustics and sound equipment. Under the direction of renowned audio engineer Tomlinson Holman, the Lucasfilm THX® sound system was developed, first to standardize dubbing theatres and then commercial

cinemas. The ultimate goal was to maintain consistency in film sound quality from the mixing stage to exhibition, so that the audience could experience the sound of a movie the way filmmakers intended them to. Upon the first film presented in a THX theatre, *Return Of The Jedi* (1983), improvements in sound quality were readily apparent. THX and its success would substantially raise the public's awareness of the importance of quality sound presentations to the overall movie experience.

Along with the triumphs of Dolby Stereo and THX, the 1980s saw a minor, though technologically significant, advancement in film sound. Dolby, in 1986, introduced a new noise reduction system known as SR (Spectral Recording) which offered substantial improvement to the dynamic and frequency range of film soundtracks. SR began to be used in films in 1987 starting with *Innerspace* and *Robocop*. Today, the six-channel 35mm magnetic printmaster for film soundtracks, encoded with Dolby SR, is the standard for audio quality in the film industry.

## The Digital Era — Setting New Standards

Although Dolby Stereo proved to be successful and convincing as a stereo movie sound medium in the 1980s, it was far from ideal in several respects. First, the optical soundtracks have always been limited in dynamic and frequency range, and vulnerable to imperfections such as scratches and dirt. Second, the channel separation after Dolby Stereo decoding is limited, due to the fact that once the original four channels are encoded into two, the full extraction of the four tracks is not possible. Third, only a single channel of surround sound is available, while 70mm 6 track Dolby Stereo soundtracks have been able to show that stereo surround sound greatly enhances the ambient sound enveloping the audience.

At the same time, the consumer and professional audio industries were making great strides into digital audio. This prompted those in the film technology industry to consider opening the frontier of movie sound to the digital age. Prior to the introduction of the digital film sound formats, there was a general agreement in the industry to use the 5.1 channel configuration—left, right, center (front), left, right (surround) and low frequency effects (LFE).

The first digital sound system for movies was Cinema Digital Sound® (CDS), a joint development between Kodak and Optical Radiation Corporation. The first film with CDS was *Dick Tracy* in 1990. The digital data was a combination of the 5.1 channels through data compression which replaced the optical soundtrack. CDS did not enjoy



commercial success, however, and had some problems causing intermittent dropouts in the sound.

Dolby Laboratories introduced Dolby Stereo Digital (later renamed Dolby Digital) in 1992 with *Batman Returns*. Dolby, and later digital formats, adopted data compression approaches to minimize the amount of digital information needed to encode 5.1 channels. They were based on subjective studies of human hearing characteristics. These techniques allowed Dolby to store the digital audio information in the space between successive sprocket holes (see Figure 5).

Digital Theater Systems' (DTS®) approach to digital film sound was to store the digital data stream, encoding the 5.1 channels, on a CD-ROM (Figure 6). A digital time code, printed on the film between the optical analog soundtrack and picture (see Figure 5), was used to keep the projector in sync with the CD player in the DTS cinema processor. The advantage claimed for this format is that the system can support a much higher data rate resulting in a lower 3.5 to 1 data reduction compression ratio compared to Dolby's 12 to 1 compression ratio. Further, the digital data is impervious to wear and defects to which on-film digital systems are vulnerable. DTS got a substantial boost for its introduction, thanks to a successful campaign by Steven Spielberg to have theatres outfitted with the new format for *Jurassic Park* in 1993. (The short-lived L.C. Concept system, developed by France's Pascal Chedeville was similar in concept to DTS.)

History would repeat itself. Just as there were three competing sound formats during the "talkies" and stereo eras, the digital sound era would be no different. Sony Corporation decided to develop its own digital sound system, Sony Dynamic Digital Sound® (SDDS®), to compete against Dolby and DTS. In addition to the 5.1 channel configuration, SDDS has added the option of two extra channels—left-center and right-center in the front (similar to the five-screen channel layout of the 1950s). The digital code is printed on the film, in the spacing along the edges (Figure 5). SDDS was the last format to appear on the cinema market with *Last Action Hero* in 1993.

All of the digital sound formats feature extensive error correction techniques, which is particularly useful for Dolby Digital and SDDS when the film print wears and accumulates dirt. The dynamic range in digital sound is some 15dB higher than for optical Dolby Stereo, meaning that quiet sounds are heard much clearer and loud sounds are much louder. Also, the .1 LFE delivers peak levels of bass up to 10dB over the main channels! This boost in bass energy allows film sound engineers to compensate for the decreased sensitivity of human hearing at

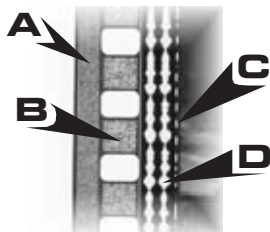


Figure 5: 35mm film showing data for the digital sound formats. A, SDDS®; B, Dolby® Digital; C, DTS® (time code). D is the variable area Dolby Stereo soundtrack, used as backup.

low frequencies compared to the midrange (where dialogue is most prominent and human hearing is most sensitive). Additionally, all digital formats have a conventional optical soundtrack (usually Dolby Stereo SR) as backup in case the digital system fails (Figure 5). This feature became a standard following the problems with dropouts in the CDS system when failure to play back the digital track occurred.

Digital sound finally offered to the moviegoer the experience of high quality stereophonic sound from six separate channels. The result is a spatial sound field which allows the audience to image sounds in a three-dimensional space, while being enveloped into the action of the drama of the film. Dialogue clarity has also been much improved. In parallel with the benefits offered by digital audio technology has been the recent expansion of movie theatre chains, each building new state-of-the-art multiplexes fully equipped to handle the demands of digital sound. The rise of new theatres with digital sound capability and high-quality sound systems has increased the moviegoing public's awareness of what film sound can do to optimize the cinema



Figure 6: DTS® CD-ROM

experience. Today, that upsurge in new cinemas continues at a rapid pace.

The film industry is of course aware of the battle brewing between the digital sound formats. The decision by many movie studios to release films in multiple formats, and by several theatres and chains to equip auditoriums to play back in more than one digital sound system, has eased this struggle for market share superiority somewhat. More importantly, this move has allowed more

of the audience to experience more films in the glory of digital sound. The playing field, however, is uneven at the moment. For example, DTS and Dolby Digital currently share similar portions of the worldwide market in terms of theatre installations, while SDDS is behind. One can only wait and see what happens to each of these formats in the future.

## Summary

The desire to bring sound and picture together to unify the experience of the moving image was first realized by Thomas Edison. After decades of attempts to make this possible, three technologies were finally successful in the late 1920s, ushering in the age of the "talkies" and the demise of silent films. In the 1950s, film sound in stereo was introduced, partly due to the precipitous loss of business in the movie industry to television, and partly to the new fascination with stereophonic sound. Expensive costs and technical problems kept stereo film sound from prospering until the late 1970s with the advent of Dolby Stereo. Dolby Stereo proved to be extremely successful, but the digital age prompted further developments in movie sound technology. In the early 1990s, three digital sound formats emerged into the cinema market. The superior qualities of digital sound, along with the ever-increasing number of cinemas with premium sound systems has heightened the public's enthusiasm for movie sound, leading to the expansion of these new theatres, and providing much optimism for the future. ■

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## Acknowledgment

I would like to thank Susan Solan and Friends of the Loew's for the opportunity to view and photograph the vintage Simplex Vitaphone projector.

## About The Author

Perry Sun is the publisher of the Movie Sound Page ([www.moviesoundpage.com](http://www.moviesoundpage.com)), the Internet's only web site devoted to the motion picture sound experience. Perry can be contacted via e-mail at [perry@moviesoundpage.com](mailto:perry@moviesoundpage.com)