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Dolby Digital—Surround EX: The Next Step in Film Sound

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Introduction

Although a great improvement over mono surround, the stereo surrounds of today's digital formats still make it difficult for mixers and sound designers to place sounds directly behind the audience. Gary Rydstrom, Academy Award[®]-winning sound designer and Director of Creative Operations for Skywalker Sound (Lucas Digital Ltd., LLC), was particularly frustrated by this limitation.

"I wanted audiences to be completely encircled by surround, and to hear sounds directly behind them," Rydstrom says. "I wanted a format that would open up new possibilities and place sounds exactly where you would hear them in the real world."

Engineers from Dolby Laboratories and THX took up Rydstrom's challenge. The result is Dolby Digital—Surround EX which debuts May 21, 1999 with the release of George Lucas's new feature film, *Star Wars: Episode 1—The Phantom Menace*.

With conventional two-channel surround technology, the soundfield in the back of the theatre can be blurred, and is often perceived as coming generally from the left or right. With Dolby Digital—Surround EX, the speakers at the rear of the theatre reproduce back surround information, while left and right surround information is reproduced by the speakers on the sides. This allows the sound designer to create "fly-over" and "fly-around" effects that are smoother and much more accurately placed directly behind or directly beside the audience as required.

"This new surround technology provides filmmakers with a powerful new creative tool for producing realistic soundtracks," said director George Lucas. "I'm proud that THX and Dolby joined forces to develop this new technology and bring it to the industry."

What does Dolby Digital Surround EX do?

It has long been known that a center screen channel is necessary to ensure the precise localization of front sounds for all viewers, including those seated off to the sides. Dolby Digital Surround EX brings similar benefits to the surround soundfield.

With Dolby Digital Surround EX, a back surround channel is reproduced by the speaker array at the back of the theatre, while left and right surround is reproduced by the side arrays (see illustration in Figure 2). This means that sounds can now be positioned behind the audience, opening the door to exciting new effects such as true 360° pans.

The back surround channel also makes front-to-back and back-to-front-transitions more realistic. Flyovers really seem to pass overhead, rather than down the sides of the theatre. Even ambient sound reproduction is improved; being less affected by the width of the theatre.

Equally as important, the new back surround channel assures that even viewers seated close to the left or right surround array experience the full scope of the surround soundfield intended by the filmmaker.

Conventional vs. Dolby Digital—Surround EX playback

Dolby Digital—Surround EX requires the addition of the new Dolby Model SA10 Surround Adapter, which is easily and quickly installed in theatres already equipped for Dolby Digital playback. Figure 1 shows a theatre equipped for Dolby Digital playback, with a full compliment of surround speakers and amplifiers (the actual number of surround speakers and amplifier channels, of course, varies from theatre to theatre). The additional channel in the Dolby Digital Surround EX format is provided through the use of a specialized matrix encode/decode process developed specifically for use in the surround soundfield.

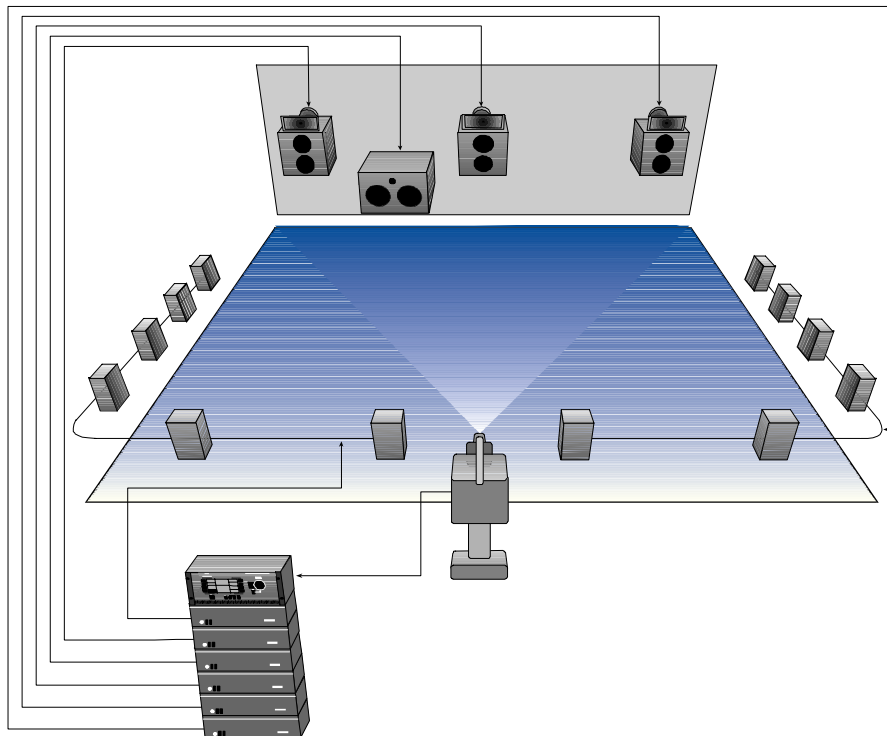


Figure 1. Conventional Dolby Digital Theatre

Figure 2 illustrates the same theatre equipped for Dolby Digital—Surround EX playback. A Dolby SA10 Surround Adapter has been added, and the surround speaker array has been rewired into four sections, enabling both two- and three-channel surround playback as described in the next section.

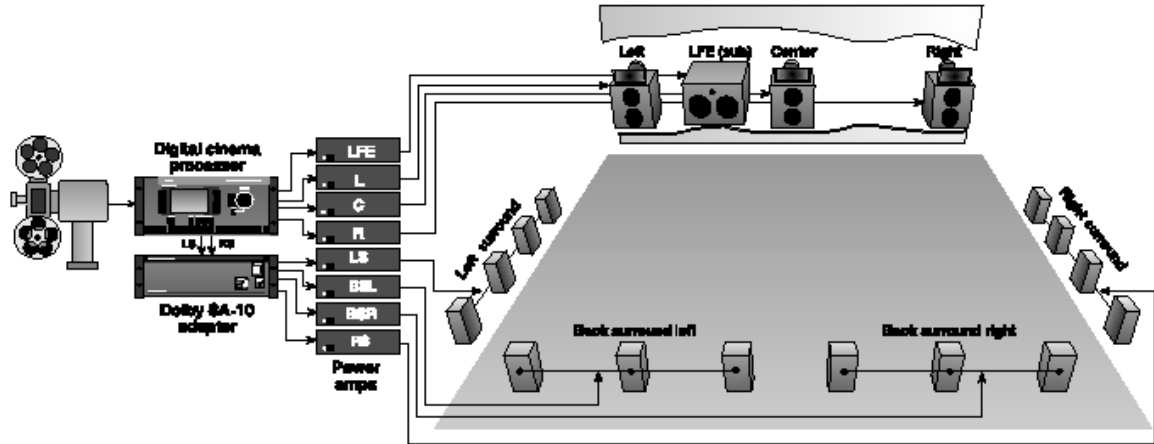
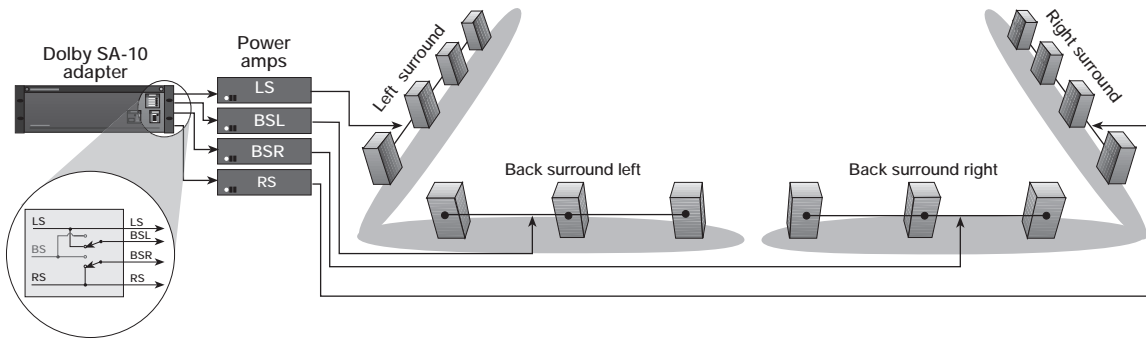


Figure 2. Dolby Digital—Surround EX Theatre

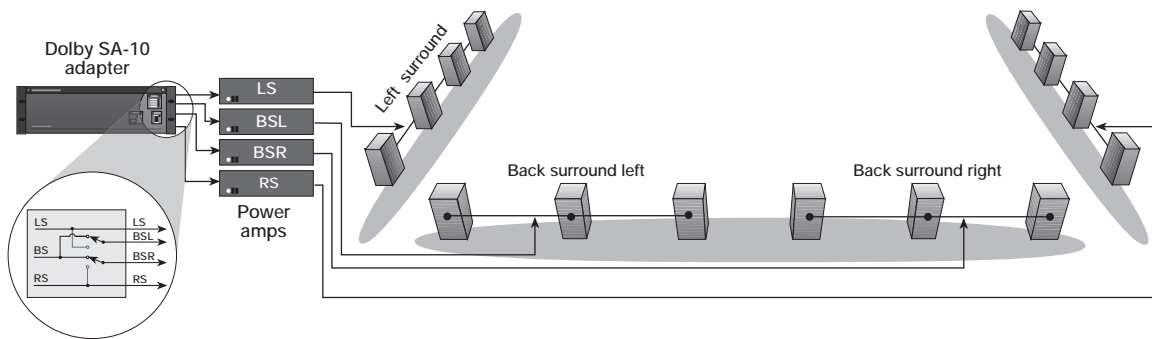
Playback compatibility

As shown in Figures 3A and 3B, the Dolby SA10 Surround Adapter supports both conventional stereo surround playback and Dolby Digital—Surround EX's three-channel surround playback. It automatically switches the surround speaker configuration to the three-channel format, and enables the Surround EX decoder, when the Surround EX mode is selected.



Conventional
5.1-channel mode

Figure 3A. SA10 in “Disable” Mode



Surround EX mode

Figure 3B. SA10 in “Enable” Mode

Print compatibility

All formatting is performed at the sound stage during the mixing process and encoded onto the master MO disk. Dolby Digital—Surround EX soundtracks are physically identical to conventional Dolby Digital tracks, and therefore require no special processing when creating the original sound negative or manufacturing release prints. As a result, there are no additional labor expenses with respect to distribution.

Exhibitor, distributor and audience interest

When this article was written, 2,000 Dolby SA10 Surround Adapters had been ordered for installation in theatres in time for the May release of *Star Wars: Episode 1—The Phantom Menace*. Clearly indicating the broad acceptance of this format enhancement. There is also strong interest from moviegoers as well, with *Star Wars* fans leading the way in embracing the new format. News of this enhanced version of the Dolby Digital format has reached the general public and will certainly be part of the decision process of the moviegoer when deciding the specific theatre to view the film. In addition to all films in the new *Star Wars* series, a variety of other upcoming titles have already committed to use Dolby Digital Surround EX. This list includes “The Haunting of Hill House” from Dreamworks SKG. As audiences and filmmakers alike become familiar with the significant new dimension it brings to theatrical film viewing, more are sure to follow.

*As of August 31, 1999, approximately 4,000 systems are installed worldwide.

Installing the new format

Because the requirements for a specific site are largely determined by the room’s acoustical properties, the following section will cover only general guidelines of the installation. For specific recommendations, consult your engineering support personnel or Dolby Laboratories, Inc.

Once the decision is made to upgrade the theatre to Dolby Digital—Surround EX, review the surround system with respect to the number and placement of the surround speakers, and be sure they are all operational. Review also the number and power of the surround amplifier channels, whether or not the processor has built in digital decoding or uses an external decoder, and the automation interface.

Assuming that the left and right side channels are adequately supported, next ensure that there are an even number (4, 6, 8, etc.) of surround speakers spaced evenly across the rear wall of the cinema to ensure smooth distribution of the back surround soundfield. Height and angle are dependent largely on the specific acoustics of the cinema; check with your local engineering support personnel.

Ensure that there are at least two channels of amplification for the back surrounds to support switching between stereo surround and Dolby Digital—Surround EX as shown in

Figure 3. Verify that the amplifiers are operating correctly and provide adequate power for proper audience coverage.

Finally, be sure that the installer is aware of the make and model of the cinema processor, and details of the automation system, to ensure proper interconnection of the audio and control lines. Note: while *Star Wars: Episode 1—The Phantom Menace* isn't being released until May, the trailers already in circulation been produced in the Dolby Digital—Surround EX format. As a result, you can take advantage of the new format as soon as it is installed.

Technical Support

Dolby Laboratories and THX engineers are preparing training sessions and the documentation necessary for field personnel to accomplish all Dolby Digital—Surround EX installations in time for the new *Star Wars* prequel's May debut. All Dolby offices around the world are equipped to provide information on soundtrack production and encoding. You may also contact Dolby via e-mail at info@dolby.com, and you'll find a wide variety of technical and trademark at Dolby's web site, www.dolby.com.