

INTRODUCING A JOINT DEVELOPMENT FROM  
DOLBY LABORATORIES AND LUCASFILM THX

 **DOLBY**  
**D I G I T A L**  
**SURROUND • EX**



# DOLBY DIGITAL–SURROUND EX™

## The New Development in Digital Surround Technology

“This new format takes us a step closer to placing sounds exactly where you’d hear them in the real world. Audiences can now be completely encircled by surround, as well as hear sounds played directly behind them, opening up all sorts of possibilities.”

**Gary Rydstrom**

Director of Creative Operations  
Skywalker Sound (Lucas Digital Ltd. LLC)

“With Dolby Digital–Surround EX, we’ve taken the technology to a level that makes an amazing difference in sound possibilities.”

**Bill Jasper**

President  
Dolby Laboratories

Dolby Laboratories Inc. and Lucasfilm THX developed the Dolby Digital–Surround EX format in response to requests from Gary Rydstrom, Director of Creative Operations at Skywalker Sound (Lucas Digital Ltd. LLC), who had wanted added flexibility in creating soundtracks for many years.

### What it is

Dolby Digital–Surround EX adds a third surround channel to digital film sound, a concept first envisioned by sound designers at Lucasfilm’s Skywalker Sound post-production facility. Jointly developed by Dolby Laboratories and Lucasfilm THX, Dolby Digital–Surround EX gives mixers a new level of creative freedom.

Dolby Digital–Surround EX is fully compatible with all current 5.1 digital formats and theatre systems. Prints that use it play normally with current systems, and provide the extra surround channel when played over systems equipped with a new Dolby SA10 adapter.

### What it does

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 center 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). This means that sounds can now be positioned behind the audience, opening the door to exciting new effects such as true 360-degree 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 important, the new back surround channel assures that even viewers seated closer to the left or right of the theatre can also experience the total surround ambience intended by the filmmaker.

### What it requires

In most cases, equipping an existing 5.1 digital installation for Dolby Digital–Surround EX is simple and economical. All it usually requires is adding the new Dolby SA10 adapter; wiring the surround speakers into left, left

back, right back, and right groups; and providing additional surround amplification.

On the production side, Dolby sound consultants will provide filmmakers with the assistance and equipment necessary to prepare compatible Dolby Digital–Surround EX surround soundtracks.

### How it came about

As they began to envision the sound design for the new-generation *Star Wars: Episode I—The Phantom Menace*, mixers at Skywalker Sound took a critical look at the 5.1-channel configuration that has been the state-of-the-art since 1992. While two surround channels constituted a major

step forward from the single channel of earlier formats, they nevertheless limit creativity, and viewers seated far to the left and right of the screen are at a disadvantage. Experiments showed that a back surround channel provides exciting new creative opportunities and better delineates the soundfield for off-axis listeners. Skywalker staff then turned to Dolby Laboratories and Lucasfilm THX to make the new surround configuration a reality.

### THX certified theatres

THX certified theatres provide the ideal environment for getting the most out of Dolby Digital–Surround EX. THX certified theatres

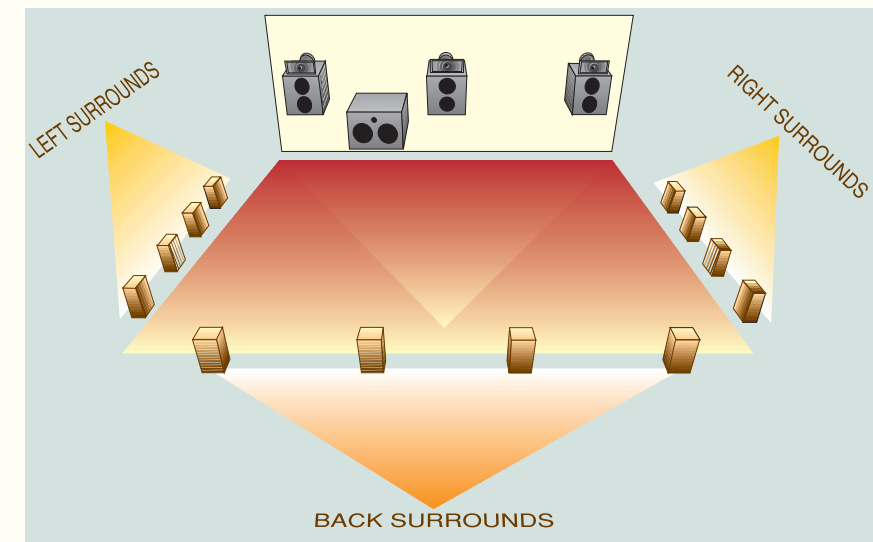
are uniquely suited to take advantage of this new format as they meet acoustical requirements specifically developed for movie soundtracks. In addition, they have most of the necessary equipment already in place for proper playback, including speakers on the rear wall of the theatre.

### More films to follow

In addition to *Star Wars: Episode I—The Phantom Menace*, a number of other upcoming titles have been announced using Dolby Digital–Surround EX.

### Dolby Digital–Surround EX at a glance

- Debuts in May 1999 with *Star Wars: Episode I—The Phantom Menace*.
- Adds back surround channel to 5.1 digital.
- Compatible prints play normally on current systems, and provide back surround on systems with new Dolby SA10 adapter.
- Enables rear localization, true 360° pans, convincing flyovers, new effects.
- Viewers seated close to the left and right of the screen experience better-balanced surround sound.
- Simple, economical theatre installation.



## Exhibitor Questions and Answers

### Do I have to re-equip my theatre to play Dolby Digital-Surround EX prints?

No, Dolby Digital-Surround EX is designed to be compatible with current 5.1 digital film sound and is not a new digital format or replacement. In fact, digital prints prepared with Dolby Digital-Surround EX play normally over current 5.1 systems. Adding Dolby Digital-Surround EX capability is an option, not a requirement (see next question).

### What equipment do I need to play films in Dolby Digital-Surround EX?

First, you'll need a new Dolby SA10 adapter (see below) installed between your system's 5.1 digital cinema sound system and the power amplifiers.

Second, your theatre's surround speakers must be wired as separate left side, left back, right back, and right side arrays. With some installations, the number and location of surround speakers may also require updating.

## Dolby SA10 Surround Adapter

The Dolby SA10 adapter upgrades any existing 5.1 digital cinema sound system to three surround channels on digital prints prepared with the Dolby Digital-Surround EX process. It is easily installed in the booth between the existing cinema sound processor and the power amplifiers.

In addition to replaying the three surround channels, the SA10 uses three seven-band equalizers operating in conjunction with tunable high- and low-frequency shelves to ensure smooth surround-speaker response to the international standard curve. Front-panel controls include a mode selector (5.1 or Dolby Digital-Surround EX), signal-present channel indicators, and a backup power supply selector. Rear-panel connections make it possible to select the Dolby Digital-Surround EX mode remotely with automation systems.

Like all Dolby cinema sound products, the SA10 is fully supported by hundreds of factory-trained technicians worldwide, on-call emergency assistance, and the most experienced distributor network in the industry.

## SPECIFICATIONS

### Construction

Rack-mount chassis frame with plug-in boards accessible behind hinged front panel.

### Signal Connections

Standard screw-type terminal blocks for audio signal inputs. Output audio signals and automation control signal connection provided via 25-pin D connectors.

**Inputs:** Ls and Rs inputs, 10 k $\Omega$  nominal input impedance, 120 mV nominal input sensitivity for operating level.

**Outputs:** Output impedance: 150  $\Omega$ . Load greater than 600  $\Omega$ . Maximum output level +8 dBu. Typical operating level -18 dBu. Operating levels from 10 mV to 200 mV may be accommodated.

**Control Input:** Mode control provided via 25-pin female D connector.

### Surround Loudspeaker Equalization

Equalizers for Left Surround, Back Surround, and Right Surround speakers provide  $\pm 10$  dB high- and low-frequency controls with adjustable turnover frequency, plus seven adjustable  $\pm 6$  dB narrow band filters covering the range from 120 Hz to 8 kHz.

### Distortion (any channel)

1 kHz: typically  $< 0.15\%$  at Dolby level (50% modulation).

### Dynamic Range

Typically 88 dB.

### Dimensions

3-U rack-mount chassis. Faceplate: 133 mm x 483 mm (5.25" x 19"). Maximum projection behind mounting surface: 308 mm (12.1"). Maximum projection in front of mounting surface: 12.70 mm (0.50").

### Weight

10.1 kg (22.3 lbs).

### Power Requirements

Power supplied from two outboard transformers (one main, one emergency backup). Normal supply: 24 VAC, 600 mA,

Third, you may need additional amplification to drive the two back groups of loud speakers. In some cases this can be accomplished by reconfiguring the existing power amps, while in others an additional power amp may be required.

### How will I know if I'm showing a Dolby Digital-Surround EX film?

Film cans for Dolby Digital-Surround EX prints will be clearly labeled.

### What steps do I take to play a film in Dolby Digital-Surround EX?

Press one button on the Dolby SA10 adapter in the booth or send a command from the automation system.

### How can I be sure the installation is done correctly?

Dolby theatre equipment suppliers can assist in the proper installation of Dolby Digital-Surround EX, and Lucasfilm THX engineers can also provide advice as necessary. All upcoming training seminars will include details on the implementation of the Dolby SA10 surround adapter.

backup supply: 24 VAC, 200 mA. No fuse requirements, outboard transformers are self-protecting.

### Ambient Operating Temperature

Up to 40° C.

### Regulatory Notices

U.S.: This unit complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules, and carries UL listing.

Europe: This product complies with the requirements of Low Voltage Directive 73/23/EEC and EMC Directive 89/336/EEC and carries the CE marking accordingly.

### Warranty

One-year limited, parts and labor.

### DISCLAIMER OF WARRANTIES:

Equipment manufactured by Dolby Laboratories is warranted against defects in materials and workmanship for a period of one year from the date of purchase. There are no other express or implied warranties and no warranty of merchantability or fitness for a particular purpose.

### LIMITATION OF LIABILITY:

It is understood and agreed that Dolby Laboratories' liability whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the cost of repair or replacement of the defective components and under no circumstances shall Dolby Laboratories be liable for incidental, special, direct, indirect or consequential damages (including but not limited to damage to software or recorded audio or visual material), or loss of use, revenue or profit even if Dolby Laboratories or its agents have been advised, orally or in writing, of the possibility of such damages.

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