

Technical Requirements for Dolby Surround in Recording Studios Using the Dolby SEU4 Encoder and SDU4 Decoder

Introduction

Dolby Surround is a format that enables the production and delivery of multi-dimensional soundtracks for television, cable, consumer video, multimedia and other stereo media. Once created, Dolby Surround soundtracks can be recorded, broadcast and reproduced the same as any conventional stereo program, including compatible monaural playback. Consumers equipped with Dolby Surround systems will experience the full measure of spatial dimensionality built into these programs, just as they do from thousands of Dolby encoded movies currently available on home video media. This paper outlines the basic equipment necessary for studios to produce soundtracks in Dolby Surround.

Surround Starts with Stereo

Many aspects of producing in Dolby Surround are the same as producing in stereo. The main difference is that the mixing console must ideally have at least four buss outputs to feed a Dolby Surround encoder, and some additional speakers and amplifiers are needed to monitor the center and surround channels via a Dolby Surround decoder.

In most cases, the finished two-channel encoded soundtrack is all that will be recorded. However, it is sometimes desirable to record the four-channel "stems" (encoder input signals) onto separate tracks when further elements are to be added later, such as with music pre-mixes for movie soundtracks.

Necessary Equipment

1. Dolby Model SEU4 Surround Encoding Unit.

The SEU4 encodes four input signals (Left, Center, Right, Surround) into two output signals (Lt, Rt).

2. Dolby Model SDU4 Surround Decoding Unit.

The SDU4 decodes two input signals (Lt, Rt) into four output signals (L, C, R, S) using Dolby Pro Logic Surround decoding technology. The unit also provides switchable stereo and monaural monitoring modes for evaluating compatibility. A ganged master fader allows all output channels to be varied together. A note about Dolby's products: The SEU4 and SDU4 are 1U high, 19" rack mount professional units. Both use XLR type connectors with balanced line levels adjustable from -10 to +8 dBr (0 dBr=0.775 Vrms). Pin 2 is "hot." For unbalanced connections, pin 1 is tied to pin 3 for proper operation.

3. Mixing console.

Mixing will be performed in four channels, so a four-buss output structure is needed, as shown in Figure 1. A conventional stereo console with sufficient subgrouping and auxiliary sends may be used. Automation is not required, but may be beneficial for fine-tuning special effects. Four channel pan pots are also desirable for certain effects, although even basic pair-wise left-right and center-surround panning facilities may be adequate for some productions.

The SDU4 mode and level controls simplify connection directly to monitor amplifiers. Figure 1 shows typical signal flow.

Program meters (with peak and average weighting) are recommended to read the four encoder input signals and two encoder output signals.

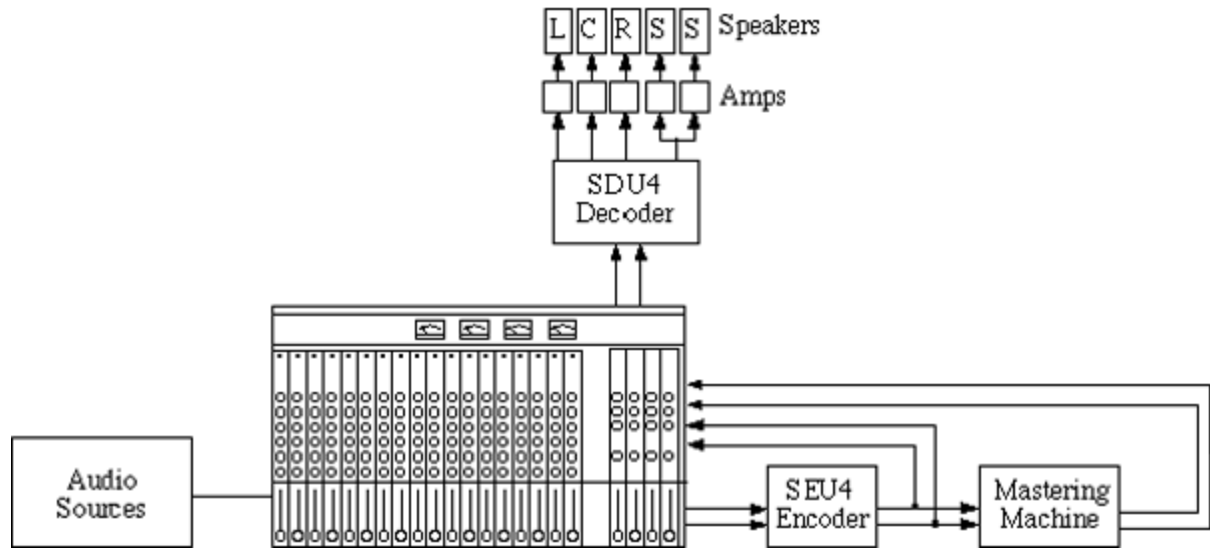


Fig. 1 Mixing in Dolby Surround from Multitrack Elements

4. Speakers and amplifiers.

Three speakers are needed across the front to produce the left, center and right channels. Ideally, all three will be the same model for best acoustic matching. Unfortunately, it may not be possible to use the same speaker in the center due to space restrictions. In such cases, finding one that blends well sonically is important. Using a smaller model from the same product line as the left and right speakers is recommended. Use of a magnetically shielded speaker is necessary whenever that speaker needs to be positioned near a video monitor.

The center speaker needs to be at the same height as the left/right pair for best imaging. It is also important to confirm that the polarity (phasing) is correct in all three front speakers so that panned effects create proper phantom images between the center/side speaker pairs.

At least two surround speakers will be used, but room shape and area of coverage may dictate that four will be preferred for even coverage. Refer to the room layouts in Figures 2 and 3 for typical speaker arrangements. The requisite characteristics for the surround speakers are smooth response from 100 Hz to 7 kHz and wide dispersion. The same type of small speaker used for the center will often be used in the surrounds to assure sonic matching. Generally, good quality two-way bookshelf speakers are sufficient for surround channel use.

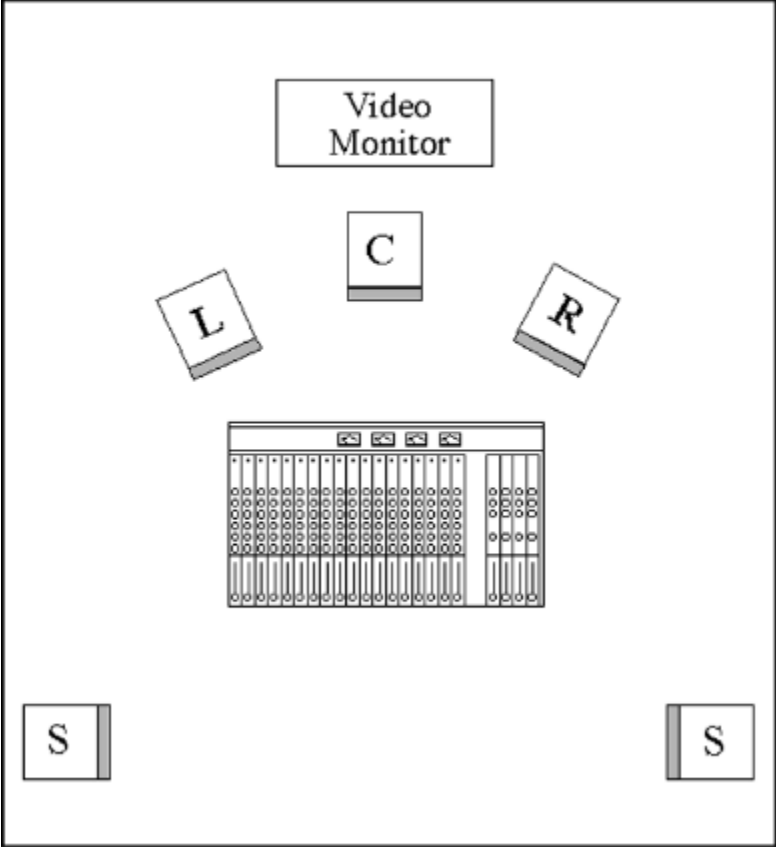


Fig. 2 Two Surround Speakers

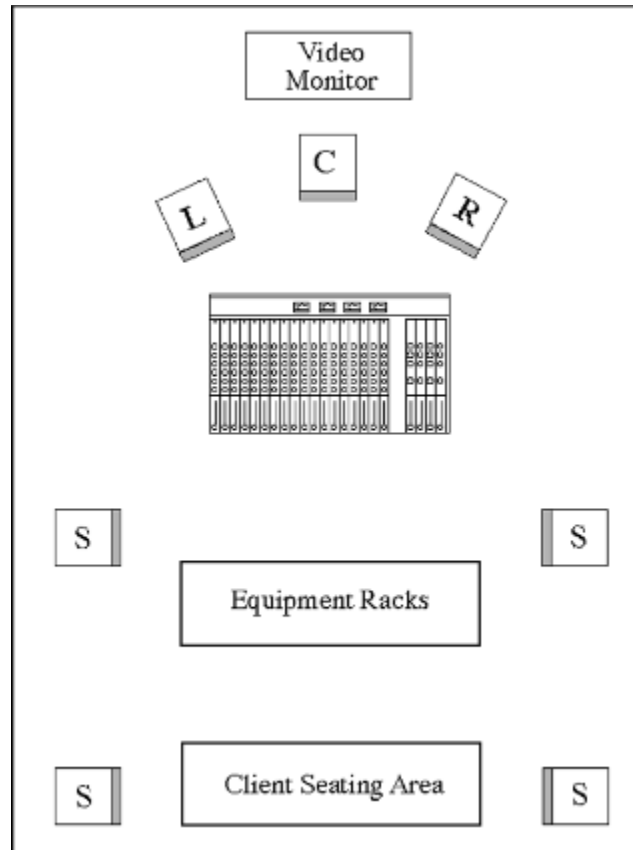


Fig. 3 Four Surround Speakers

Surround speakers are typically located two or three feet above ear level, and should not be aimed directly at the mixing position. The goal here is for an evenly dispersed soundfield, with no prominent hot spots or “in the head” images. While the surround speakers should be “in-phase” with each other, their absolute polarity has no relevance to the front channels since the decoder introduces time delay into the surround channel.

The amplifiers used for center and surround channels should be similar to the ones in the left/right channels. Note that only one amplifier is needed to drive all the surround speakers, since the total acoustic output requirement is no greater than in any other channel. Series-parallel wiring, as appropriate, should be used.

5. Ancillary Equipment.

Most studios have an array of signal processors available, and some are indispensable for proper Dolby Surround production. Limiters top the list, and some may need to be dual- or triple-ganged in special cases. Time delays, phasers/flangers, echo/reverb and equalization are also possibilities. A Dolby Surround mixing consultant will be instrumental in sorting out specific processor needs for a given production.

Dolby Surround Mixing Consultants

Dolby Surround mixing consultants are available to assist with the initial installation of the equipment and to perform the alignment of the encoder, decoder and monitoring system. Instruction on the use of

equipment may also be available at this time. Dolby consultants are also available for staff training. All services are on a time plus travel service contract basis and are billed at half day or full day rates.

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