Dolby Pro Logic II vs. SRS Circle Surround

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In the same way that digital technology has replaced analog, surround sound is replacing stereo. Phenomenal sales of DVD-video players and home theater systems confirm that consumers enjoy sound from all around. Savvy broadcasters understand that they must somehow squeeze 5.1 channels through their 2-channel audio signal paths.

While matrix surround systems such as Dolby Pro Logic II (DPLII) and SRS Circle Surround (CS) cannot perform as well as discrete digital systems, they are effective solutions for many broadcasters. To learn more about the operation of each system, and in particular to test the sonic performance of them, we assembled a Dolby DP563 encoder and DP564 decoder, and SRS CSE-07 encoder and CSD-07 decoder, and put them through their paces.

The well-known Dolby Pro Logic (DPLI) technology was first introduced in 1987, allowing broadcasters, via 2-channel audio delivery, to deliver surround sound audio to home users. Subsequently, Dolby introduced its improved matrix surround technology, Dolby Pro Logic II. DPLII allows the encoding and decoding of stereo surround channels with full bandwidth, with improved channel separation and more intelligent logic steering mechanism. It also permits flexible mixing of the LFE channel so that broadcasters can tailor the signal to the end users' needs. As in DPLI, home audiences can switch between stereo and surround sound playback of matrix-encoded content, depending on their preference and playback systems.

SRS burst onto the scene in the late 1990s with its CS technology, a conceptually similar matrix encoding/decoding system. The company has expanded its market share by securing deals with several major broadcasting networks. CS claims to offer a more versatile system that delivers multichannel audio from any stereo, matrix-encoded (including DPLI/II) or CS-encoded content. It provides full bandwidth in all channels; the capability to encode an L, R, C, Ls, Rs, Cs or LFE signal as the dominant channel; dual-band steering logic for good channel separation and smooth steering between Ls and Rs; and front and surround channels. Moreover, its decoder is bundled with other proprietary SRS technologies such as Dialog Clarity and TruBass for center channel and bass enhancement.

Both the Dolby and SRS systems are fully backward-compatible with mono, stereo and surround. (CS is also compatible with DPLI/II). This compatibility makes this matrix surround technology a powerful and flexible way to deliver realistic surround sound for broadcasting, film, music and game applications, as well as Internet streaming. In other words, both are very viable products.

But because DPLI/II-equipped A/V receivers can be found in millions of household home theaters, can CS, the new kid on the block, compete with the more established technology? One key to potential success is sound quality. To find out if either has a sonic edge, we set up both systems, ran identical source material through both encoder/decoder pairs and listened to the results.

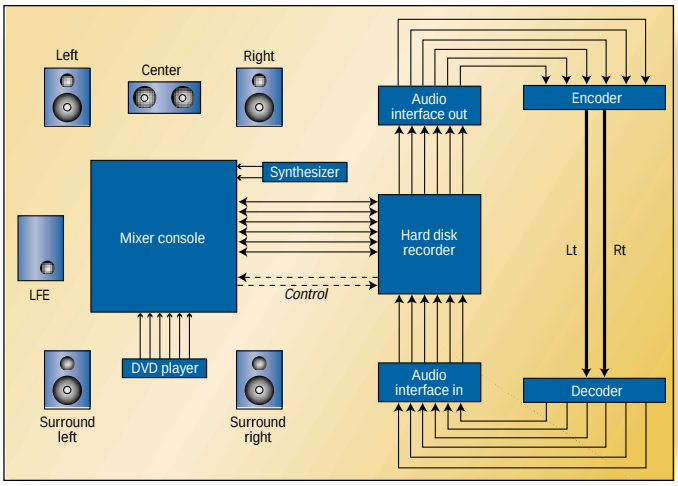

Figure 1. The listening test comparison of the Dolby Pro Logic II and SRS Circle Surround matrix audio systems was conducted in an audio/video post-production studio.

The hardware setup

The systems were set up in a post-production studio equipped with two Yamaha 02R consoles, ProTools, audio interface in/out and other typical gear, as shown in Figure 1.

Next, the SRS encoder was connected to a hard drive recorder audio interface output; six analog channels were directed to the encoder via balanced inputs. The encoder's outputs, (total left channel and total right channel) were directly connected to the decoder's inputs with two analog cables. Six distinct outputs from the decoder were then directed back to the hard disk recorder so the encode/decode signal could be stored for playback.

Setting up the SRS system was a simple task, which is a significant advantage. The signal path was tested with the encoder's internal test signal. The system was calibrated by adjusting the output levels of each channel using gain trim controls on the front panel of the decoder. (There are no level adjustments on the encoder.) The system is designed to drop into an analog signal path; the encoder has analog inputs (its own A/D), and the decoder has analog outputs (its own D/A).

The Dolby system was connected in a similar manner. However, because the DP563 encoder has only digital BNC inputs and outputs, an additional A/D converter was needed to convert the six analog channels from the audio interface into three digital channels for input into the encoder. (We used a Dolby model 587 multichannel audio converter, but any 8-channel converter can be used.) Controls on the encoder's front panel provided access to setup parameters such as monitor status and speaker configuration for system testing. Also, the decoder can be remotely controlled. Altogether, it is more sophisticated and flexible in operation and configuration than the SRS system. However, extra features and flexibility also increase complexity and require more setup time.

The listening test

To conduct an impartial A/B listening test comparing the Dolby and SRS matrix surround systems, we used our own source materials: two original surround recordings and several commercially available DVD movies. We also created special files for our very own matrix surround "torture" test.

We began by listening to a passage from a live recording of Mahler's *Symphony No. 5*. Both systems performed equally well in terms of overall pleasantness. However, there are some fairly audible differences between the two. The CS-decoded version accurately reproduced the original with a more diffused and spatially wider soundfield across the front speakers compared to that of the DPLII version. Different sections of the orchestra and choral could be easily localized, yet the sense of envelopment was preserved.

The DPLII version outperformed CS with a more accurate reproduction of the original spectrum; the balance of the high-frequency range to the low- and mid-range was well-maintained. A bass boost was observed in the CS version, which imparted a fuller sound but also at times "muddied up" the mix.

However, the most significant difference between the two systems occurred at the end of the recording. The audience applause, which was mixed

predominately to the rear surround channels in the original recording, was distributed over the front channels in the DPLII version, while the CS version preserved the front-rear channel balance more accurately compared to the original with just slight leakage to the front speakers.

Turning to rock 'n' roll, we chose an original surround recording that had very little center channel content, as is the case in some surround recordings. We immediately identified the bass boost in the CS-decoded version. Because rock music typically has greater bass content compared to classical music, the boost was clearly noticeable and sometimes overpowering.

Both systems handled the "phantom center" quite well; no significant spatial artifacts were observed. The CS version had more separation across the front speakers with good clarity that was similar to the classical example, while the DPLII version had more emphasis in the middle, which provided a better sense of definition and presence.

We next auditioned several soundtracks (from DVD) filled with explosive sound effects. The DPLII version excelled with accurate reproduction of the originals in terms of transparency and dynamics spectrally, and surround envelopment and localization spatially. It had a tight and punchy bass that was more than sufficient for rumbling explosive sound, while the high end was crispy and sharp. Spatially, it provided excellent separation between all speakers with excellent localization of panned sound sources in all directions.

The CS version, on the other hand, had a ground-shaking low end for the explosions but a slightly darker high end compared to that of the DPLII version. It had a much diffused soundfield and smoother panning, which worked quite well for ambient sound. However, it suffered from poor localization due to interchannel crosstalk. For example, circling helicopters sounded like they were coming from all directions.

Finally, our torture test. To stress the steering logic of the two systems, we sequenced and recorded a series of kick drum hits bouncing between the front channels (L-C-R), the rear channels (Ls-Rs), front and rear, and between the LFE and the five main channels. The DPLII-encoded version excelled in this category. Interchannel crosstalk was minimal with few spatial artifacts, especially between the five main channels and the LFE channel. With only a slight clipping in the center channel and double flaming of the drum hits (due to a default 15-ms rear surround delay), the DPLII system passed our test easily.

The CS steering logic, however, seemed to be confused by the test. With an apparently slower reaction time, the CS-coded version exhibited severe crosstalk between all speakers and abruptly switched content from the LFE to the main channels. In this torture test, we particularly preferred DPLII.

Summary

DPLII and CS are competing products, but each offers advantages and disadvantages to a potential buyer. Because of the built-in A/D converters in the SRS CSE-07 encoder, it and the CSD-07 decoder are easy to drop into an analog signal path. Moreover, it is fast to set up and simple to operate.

Because of its digital-only input, the Dolby DP563 encoder is more suited to a digital signal path. It and the DP564 decoder, at the expense of complexity, offer greater operational sophistication. Finally, at least in our listening tests, although neither system is as transparent as discrete digital coding, we generally preferred DPLII over CS. Both systems provide surround sound over any 2-channel service and accomplish a significant upgrade from stereo to multichannel sound. BE

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