

MUS1215 Discussion Notes
What is Surround Sound?
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What are AC-3, DTS, DVD-A, and 5.1 surround sound?

Consumer market is flooded with both DVD and CD Players capable of digital 5.1 playback to Surround Sound HiFi systems.

5.1 allows for much wider soundstage than stereo – an approximation of true environmental acoustic space.

Playback Formats

Mono 1 channel playback

Stereo 2 channel with “virtual centre” and stereo soundstage.

Quadraphonic 1970's format on vinyl and 4 track tape

Dolby Surround and Dolby Pro Logic - Multi-channels encoded to stereo 35mm Film soundtrack for Cinema playback used left, center, and right front channels as well as a monaural, limited-bandwidth rear channel for special effects later expanded to include a separate Low Frequency Effects (LFE) channel for sub woofer. Suffered from poor quality and phasing effects.

THX (Tomlinson Holman) – digital encoding and the beginning of true 5.1 playback. Uses six separate channels: five channels with bandwidths of 20 Hz to 20 kHz and one Low Frequency Effects (LFE) channel with a frequency response rated from 5 Hz to 125 Hz. The channels are designated Left (L), Right (R), Center (C), Left surround (Ls), Right surround (Rs), and Low Frequency Effects (LFE).

Dolby Digital codec also known as **Dolby AC-3** used on DVD-Video movie soundtracks and included in the High-Definition Television (HDTV) standard.

DTS (Digital Theater Systems) codec uses less data compression and requires more bandwidth and data-storage space than Dolby Digital.

Recording

Surround Sound is basically 6 individual audio tracks routed to six speakers. No standard has been established for assigning channels to tape/disk tracks for surround mixing. An 8 track standard might be:

Track	1	2	3	4	5	6	7	8
Mode 1	L	R	Ls	Rs	C	LFE	Lt	Rt
Mode 2	L	C	R	Ls	Rs	LFE	Lt	Rt
Mode 3	L	Ls	C	Rs	R	LFE	Lt	Rt
Mode 4	L	R	C	LFE	Ls	Rs	Lt	Rt
Mode 5	L	C	Rs	R	Ls	LFE	Lt	Rt
Mode 6	C	L	R	Ls	Rs	LFE	Lt	Rt

Key: L = Left, C = Center, R = Right, Ls = Left Surround, Rs = Right Surround, LFE = Low Frequency Effects. Lt and Rt = left and right stereo mixes.

Basically when recording your six tracks make sure you note down their assignments so you know where they go when it comes to encoding them! Patching Pro Tools to the Yamaha 02R can also be confusing as the DAW output defaults may be different to the mixing desk.

Speaker setup

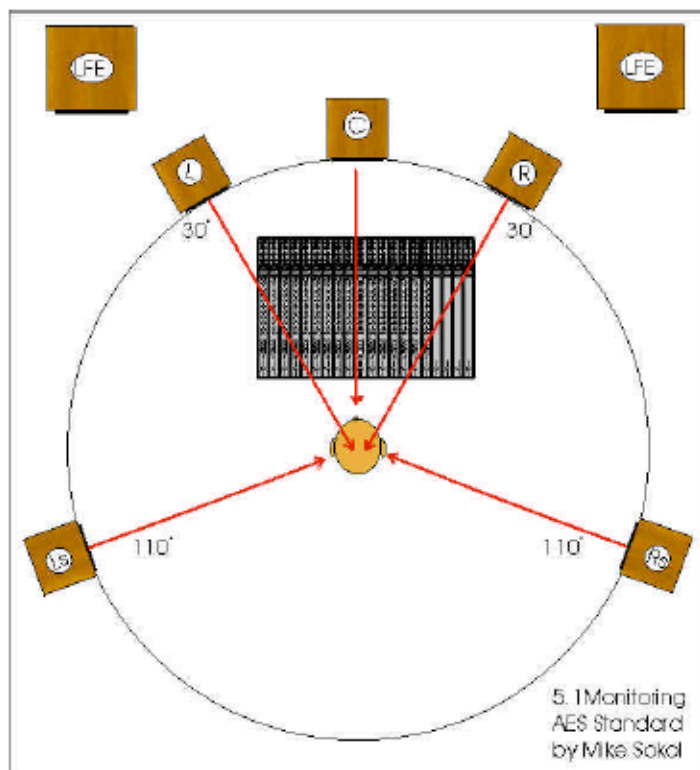


FIG. 1: Following the AES proposal for 5.1 monitoring, your left and right channels should be at 30-degree angles from center and the two surrounds should be at 110-degree angles.

Bouncing to Stereo

Just as when doing a stereo production you might bounce to mono to make sure it sounds fine in that format (ie., phasing artifacts etc.) you should always test your surround mix in stereo as there's no way to control playback once you distribute your work ie., radio broadcast and so on. Using the 8 track format the last 2 tracks can be used to do a proper stereo mix down.

In a downmix, the center-channel information gets added into the left and right channels, while the left surround and right surround channels get added into the left and right front channels, respectively. Some systems add the LFE channel into the stereo pair; other systems throw away the LFE information.

Encoding

Using either a DTS or AC3 software encoder the 6 surround tracks can be output to a WAV file that can be burnt to CDRom, DVD-Video or DVD-Audio.

DTS can be burnt as an Orange Book Audio CD (as opposed to the Red Book standard). AC3 can be burnt as a Red Book Audio CD.

Both of these formats can be played back by "most" CD players equipped with spdif digital output.

Usually the best bet is to burn to DVD-Video format for DVD playback. Always of course test the final product on your target system!